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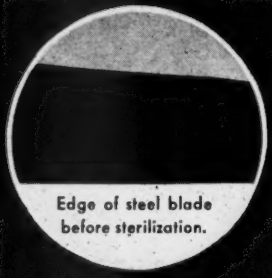

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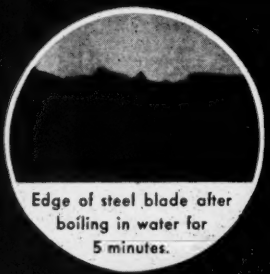

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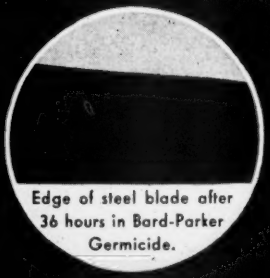

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D. M. Campbell, Editor A. T. Kinsley, Associate Editor
H. J. Mostyn, 1265 Broadway, New York, Eastern Representative

When using a leaky syringe we should not overlook the fact that 1/50,000 of a cc of virus is sufficient to produce cholera.

In 1932, Cholera cost Canada $175.00 per million hogs. During the same year it cost the United States $500,000.00 per million hogs. In Canada veterinarians handle the disease. In the United States hog-cholera virus is distributed to Thomas, Richard and Henry.

Can the production of virile pigs be expected when the breeding boar makes 10 to 15 services in one day? Kinsley says: No, and that pasture breeding is an important factor in little pig mortality.

Titrations of complement in the sera of two pigs, before and after artificial infection with hog cholera, confirmed previous observations that complement content definitely increases within a few days after infection has occurred.

Polydactylism consisting of an extra toe on each of the front feet occurred in 13 of the 125 Duroc Jersey pigs at the California Experiment Station. These pigs were the progeny of closely related parents. The anomaly occurred in both males and females in about equal proportion.—*Jour. Herd.*

Two cases of Salmonellosis in swine, in the Philippines, has been observed by T. Topacio. These are the first cases of suipestifer infection recognized and reported in the Philippines.

The *B. Alcaligines suis* frequently remains localized. Thus, porcine Brucellosis may be manifested by orchitis or mastitis. Abortion may or may not occur in swine infected with *B. alcaligines suis.*

Pregnancy urine in doses of from 10cc to 20cc administered every two or three days to swine four or five months of age, was found to increase the average daily rate of gain 115 grams per day, compared with the gains of a control group, according to E. P. Tschernozatonskaja. The pregnancy urine also caused permanent inhibition of sex activity.

The blood serum contains calcium ions, phosphate ions and potassium ions in a delicate physiological balance, maintained by hormonic influences, if not by both vitamin and hormonic influences together. The outstanding influence is the effect of the parathyroid, which is nearly parallel in effect to vitamin D; it having been proved that the vitamin D can be substituted successfully for the hormone in maintaining serum calcium.

The gizzard of the chicken is a food grinder but not a digesting organ.

* * * *

The growth rate of a spontaneous mammary carcinoma can be controlled by a diet deficient in cystine and methionine.

* * * *

Following a period of growth inhibition, the administration of either cystine or glutathione exerts a striking stimulating action on tumor growth.

* * * *

The tissue of the peritoneal cavity responds actively to a dust introduced as a foreign body, and this response is of such a character that it may be used as a basis for the classification of industrial dusts.

* * * *

In 1931, there were 4,356 persons bitten by dogs and reported to the Illinois Department of Health. In the first nine months of 1936, the number was 15,470.

* * * *

In 1931, of the heads examined by the State Department of Health in Illinois, 215 were positive for rabies. In 1935, the number was 649.

* * * *

In 1934 the Illinois State Department of Health supplied 1459 Pasteur treatments to citizens of the state at a cost of $9,000. In 1935 it supplied 2240 treatments at a cost of $13,000, and in the first six months of 1936, it supplied 1448 treatments.

* * * *

While witches and wizards used cats as their "familiars," to invoke the Power of Evil, the dog was the friend of man who could understand those powers that no magician was himself cunning enough to exercise.—*The Amer. Ken. Gaz.*

* * * *

In waging war on animal disease we shall be accounted remiss if we do not employ every available means for lessening its toll even though some of our methods are not perfect. To wait for the one all-sufficient method for combating any given disease is difficult to justify to owners of animals that are dying.

Muscular cramps, convulsions (tetany) are a consequence of an excessively lowered calcium-phosphate balance, and are aggravated by alkalosis. The administration of acids or phosphate permits the mobilization of calcium necessary to relief.

* * * *

A recent finding indicates that most cases of angina pectoris are really cases of esophagus cramp, probably due to calcium deficiency in hypersensitizing the vagus. The surgical remedy in this disease is the removal of the thyroid, here explainable on the ground that the thyroid is a powerful calcium eliminator, and its influence is bad where the intake is already deficient.

* * * *

It is probable that a physiological saturation of both serum calcium and phosphate ions exists, and any increase of either must result in excretion of the other (or its deposit in the bone reserves). This explains the value of phosphate in the treatment of rickets; it promotes deposit of calcium in the bone, and explains the finding that most rickets is rather due to phosphate shortage than a low calcium intake. In fact, the probability is that if a proper balance of mineral salts is present in the food intake, a low mineral diet causes only delayed growth.

* * * *

The balance existing between the calcium and potassium ions is in all probability important in the maintenance of a balance between the sympathetic and parasympathetic nervous systems, potassium promoting activity or sensitiveness of the latter, calcium of the former.

Potassium is utilized in the body mainly in organic combination as contrasted with sodium which is usually in the inorganic form. Excessive intake of sodium chloride causes elimination of calcium and potassium, the more important minerals from a cell activity standpoint. Sodium chloride seems to have the function of maintaining the osmotic balances, and the level is controlled mainly by the cortical hormone of the adrenals.

A Histological Study of Bovine Udder Parenchyma

By GLENN C. HOLM, Ames, Iowa
Department of Veterinary Hygiene
Iowa State College[1]

Introduction

This study was made to determine the histological structure of normal udder parenchyma in the various stages of lactation and rest. It was thought that a study of this nature would be of value in future investigations of bovine mastitis.

Historical

Lenfers[1] and Kabdebo[2] give very good reviews of preceding literature. For that reason only the more pertinent work will be reviewed in this paper. Turner[3,4,5,6] made a detailed study of the bovine udder. He studied the embryonic development, the cause of growth and function, the structure, and the secretion of milk and the milking process. Turner and Gardner[7] observed the relation of the anterior pituitary hormones to the development and secretion of the mammary gland. Turner and Reineke[8] studied involution of the mammary gland. Emmerson[9] and Bitting[10] reported on the gross anatomy of the bovine udder. Alexander[11], Ernst[12], Wall[13], Pedersen[14] and Winkler[15] discussed the normal udder in connection with their investigations of udder diseases. Jensen[16], Aikman[17], Plumb[18], Wulff[19] and Hammond[20] describe the udder as it pertains to their studies in physiology of milk secretion. Ellenberger and Trautmann[21], in their book dealing with the histology of domestic animals, compare the structure of the mammary glands of the various animals. Furstenberg[22] studied the anatomy, physiology and pathology of the normal mammary gland.

Procedure

The bulk of the material for this study was obtained from a nearby meat packing establishment. The udder tissue was examined grossly for pathological alterations, and only the apparently normal tissue was taken. The tissue was immediately placed in 4% formaldehyde, to insure proper fixing. After fixing for approximately 24 hours, the tissue blocks were trimmed to the proper size and were again placed in 4% formaldehyde for 24 hours. The tissue blocks were then dehydrated, infiltrated with Altman's mixture and embedded. The sections from these blocks were cut and stained by the Delafield's hemotoxylin-ethyl-eosin method.

Studies were made on nine different animals: (1) a yearling non-pregnant heifer, (2) a two-year-old heifer, three to four months pregnant, (3) a three-year-old, lactating cow, (4) a four-year-old cow, not lactating but three to four months pregnant, (5) an aged, lactating cow, (6) two aged, non-pregnant, non-lactating cows, (7) an aged, non-lactating cow, but five to six months pregnant, and (8) an aged non-lactating cow nine months pregnant.

Discussion

A detailed description of the udder parenchyma of a young lactating cow (fig. 4) is given. These observations serve as a basis for comparison. A discussion of the udder parenchyma includes a brief description of the collecting ducts.

The framework which supports the gland is composed of white fibrous and yellow elastic connective tissue. This framework is composed of definite anatomical divisions: the elastic capsule, the interlobar connective tissue, the interlobular connective tissue and the interalveolar connective tissue. The elastic capsule, as its name indicates, is composed primarily of dense yellow elastic tissue. There are, however, blood and lymph vessels and nerves within its structure. The interlobar connective tissue ramifies from the elastic capsule. It is composed largely of dense yellow elastic connective tissue, but in addition it contains collecting ducts, blood vessels, lymph vessels, nerves and white fibrous connective

[1] Resigned June 15, 1936.

tissue fibres. The interlobular connective tissue is compact, but is somewhat thinner and more loosely constructed than the interlobar septa. During lactation the interlobular connective tissue is composed of white fibrous tissue, blood and lymph vessels, collecting ducts and nerve fibres. Kabdebo [2] found little or no yellow elastic connective tissue in the interlobular stroma of young, lactating cows. The interalveolar connective tissue is composed of white fibrous tissue, blood capillaries, lymph spaces, smooth muscle cells (the so-called "Korbzellen" or "basket cells") and possibly nerve fibres. The author, like Furstenberg [22], failed to distinguish nerve fibres in the loose, interalveolar connective tissue. The so-called "basket cells" are found surrounding the alveoli and collecting ducts. The nuclei of these cells are elongated, stain a pale blue and show chromatin granules. The author found these cells to be much less distinct than intimated by Lenfers [1], Ernst [12], Ellenberger and Trautmann [21] and Winkler [15]

Turner [5] explains the arrangement of the collecting ducts and alveoli by stating: "The gland may be compared to a tree in which the leaves represent the alveoli and the branches the connecting ducts. A somewhat better comparison would be to consider the alveoli as grapes and the ducts as the branching stems."

The alveoli are lined with a single layer of columnar epithelium. This finding is in agreement with all the writers cited, with the exception of Wulff [19] who reported greater milk secretion from many cell-layered alveoli. The height of the cells depends on the stage in the cycle of milk synthesis. As pointed out by Turner [15] and Ernst [12] the epithelial cells are taller toward the end of the cycle and lowest at the beginning of a new cycle. In the fully distended epithelial cell, one notes fat droplets and a clear homogeneous cytoplasm. The nuclei are usually pushed to one end of the cells by the fat; sometimes being near the free border but usually in the opposite end of the cells. Mitotic figures are sometimes observed in the secretory cells and occasionally two small epithelial cells may be noted lying one on the other, indicating that cell division has taken place. There are great variations in the diameters of the alveoli, due to the difference in position of the alveoli sectioned. Aikman [17] reports diameters of 0.0047-0.0078 inches and Furstenberg [22] found that secreting alveoli had diameters of 0.12-0.20 mm. The findings of the author compare favorably with these results. Corpora amylacea are occasionally observed, but these bodies do not show as much calcification as those observed in aged cows, as will be noted later.

The intralobular collecting ducts are usually lined with a single layer of columnar epithelium. Occasionally these epithelial cells show evidence of secretory activity. This observation is borne out by Turner [4] who found that after complete cessation of milk secretion a cow could be brought back to a slight duct secretion by the use of lactogenic hormones.

The interlobular and interlobar ducts are lined with two layers of epithelium; the deep layer is cuboidal and the superficial layer is columnar. These ducts are for the most part in the interlobular and interlobar connective tissue. "Basket cells" and yellow elastic connective tissue intimately surround these ducts.

The mammary gland of the non-pregnant heifer (Figs. 1 and 2) is composed primarily of fat tissue, connective tissue, blood and lymph vessels, nerves and collecting ducts. Hammond [20] stated that well developed alveoli are not noted until the eighth month of pregnancy. The ducts are found in the centers of fatty tissue masses. The majority of these ducts are lined with a single layer of columnar epithelium. The nuclei of these cells are large; the cytoplasm is homogeneous and shows no evidence of secretory activity. These observations are in accord with the findings of Kabdebo [2] and Pedersen [14].

The glandular structure of the udder of the pregnant heifer shows more changes macroscopically than it does microscopically. The adipose and connective tissue appear greatly decreased while the gland proper is considerably larger. Ernst [12] summarizes the changes by stating: "A consid-

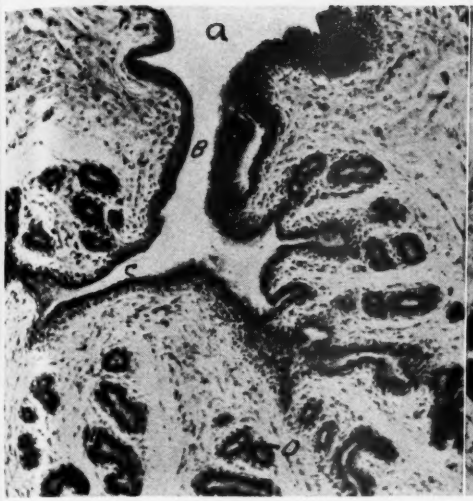

Fig. 1. Collecting ducts of a non-pregnant heifer. X90. A, B, C and D indicate the arrangement of ducts.

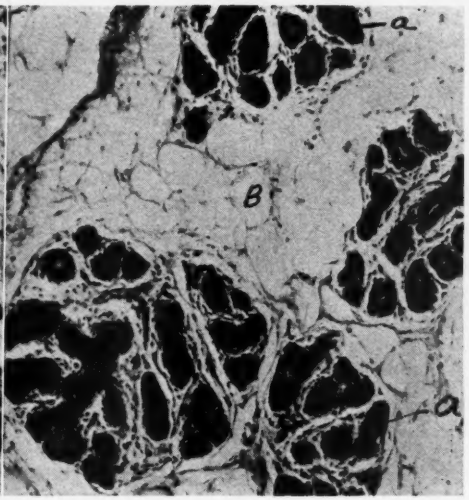

Fig. 2. Udder parenchyma of a non-pregnant heifer. X90. A, small collecting ducts situated in fatty tissue, B.

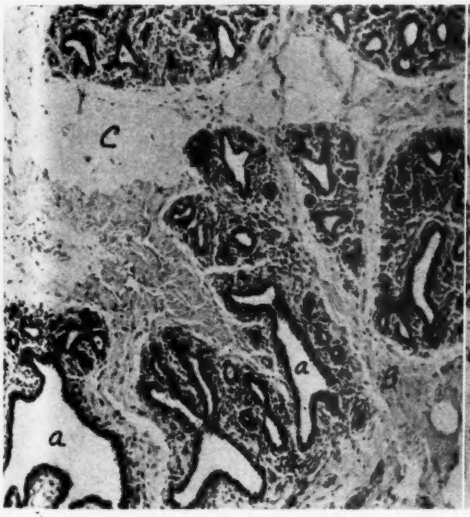

Fig. 3. Udder parenchyma of a pregnant heifer. X90. A, collecting ducts; B, interlobular connective tissue, and C, fatty tissue.

Fig. 4. Udder parenchyma of a young lactating cow, X90. A, alveoli (note the fat globules in the alveolar epithelial cells); B, interlobular connective tissue; C, a vein in the interlobular connective tissue; D, arterioles in the interlobular connective tissue; E, a small nerve trunk, and F, a capillary in the interalveolar connective tissue.

erable increase of glandular tubes appear only after the first conception. The tubes become more dilated and branch more and more, forming alveoli, from which other ducts bud out," and "The gland prepares for the secretion, growing at the expense of the atrophying or expanding connective tissue, until ready to commence its secretion." Hammond [20] adds to these observations by stating that the alveoli displace the fatty

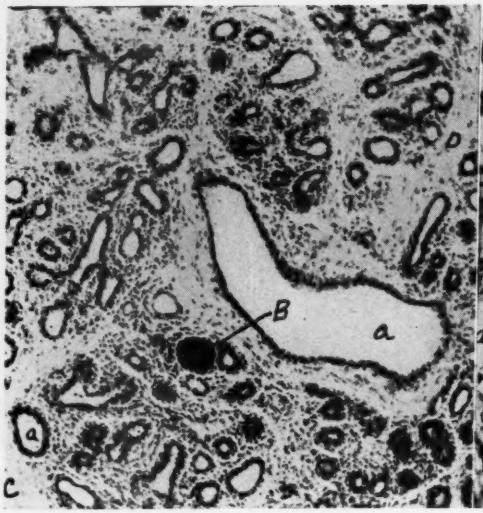

Fig. 5. Udder parenchyma of a young non-lactating cow. X90. A, collecting ducts; B, corpus amylaceum; C, interlobar connective tissue, and D, interlobular connective tissue.

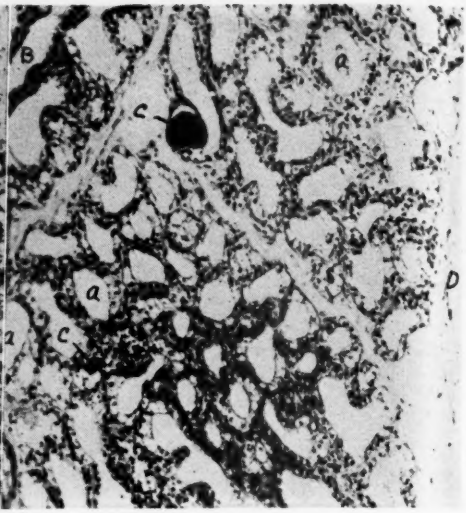

Fig. 6. Udder parenchyma of an aged lactating cow, X90 A, alveoli (note the fat globules in the alveolar epithelium); B, a collecting duct; C. corpora amylacea, and D, interlobular connective tissue.

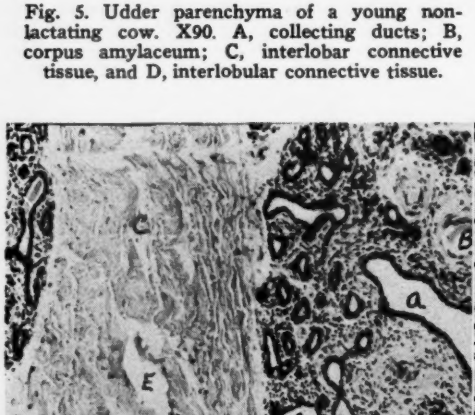

Fig. 7. Udder parenchyma of an aged, non-lactating cow. X90. A, collecting ducts; B, a vein; C, interlobar connective tissue branching into D, interlobular connective tissue; and E, fat space in the interlobar connective tissue.

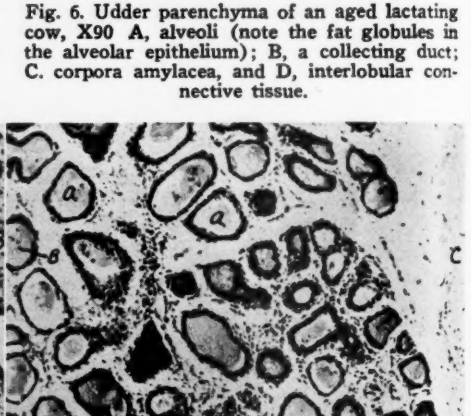

Fig. 8. Udder parenchyma of a non-lactating, but approximately nine months pregnant cow. X90. A, alveoli showing cellular and secretory activity; B, glandular secretion showing colostrum and leukocytes, and C, interlobar connective tissue.

tissue. Comparing figures 2 and 3, it will be noted that the ducts of the pregnant heifer are more fully dilated than are those of the non-pregnant heifer. It will also be observed that there is greater cellular activity surrounding these ducts.

The glandular structure is altered in the non-lactating udder (Fig. 5) of the young cow. It compares to a degree with the structures noted in the heifer four months pregnant. An increase in connective and adipose tissue is noted. The alveoli are for the most part absent; occasionally, however, very small alveoli or cell cords can be observed. Turner and Reineke [8] observed this condition in the involuting mammary gland of the goat. "Basket cells" appear, in certain instances, arranged in the connective tissue in a manner that would indicate the position formerly occupied by alveoli. The smaller ducts appear partially collapsed.

The udder parenchyma of an aged lactating cow (Fig. 6) does not differ greatly from that of a young cow. No appreciable increase in connective tissue is noted. Kabdebo [2] made the same observation. There appears an appreciable increase in concrements, which show heavy calcium deposits.

The parenchyma of an aged, non-lactating cow (Fig. 7) compares closely with that of a young, non-lactating cow with the exception, as stated above, that more concrements are observed. No appreciable variations were noted between the dry, non-pregnant cows and the dry, but five to six months pregnant cow. This finding bears out Hammond's [20] observation that the alveoli appear at approximately the eighth month of pregnancy.

The udder parenchyma of a cow, approximately nine months pregnant, shows marked evidence of cellular activity. The alveoli are again in evidence and secretory activities can be noted. The epithelial cells lining the alveoli appear greatly distended. Chromatin granules are observed near the free borders of the cells. This finding is also reported by Ernst [12]. The cell cytoplasm appears granular. Fat droplets are found in the cells. The nuclei are large and in many instances show indication of mitosis. The colostrum bodies as reported by Jensen[16] and Ernst[12] are present. Leucocytes appear in the connective tissue and alveoli.

Acknowledgment

The author is indebted to Professor H. L. Foust, Miss Margaret W. Sloss, and Professor E. A. Benbrook for valued assistance.

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Resistance to Helminth Parasites In Domestic Animals*

By J. D. MIZELLE, Urbana, Illinois,
Assistant Parasitologist,
State Department of Agriculture[1]

A PARASITE may be defined as an organism that lives for a part or all of its existence in or on, and at the expense of, another organism, called the host. General categories to which parasites may be assigned depend entirely upon the criteria used for separation. Thus we speak taxonomically of the protozoa, tremtoda, cestoda, nematoda, acanthocephala and arthropoda which taken together contain the majority of animal parasites. Based on habitat and food relationships we encounter intestinal, lung, blood, tissue, diurnal, nocturnal, intermittent, facultative, obligatory, ecto- and endo-parasites.

Parasitism probably arose from a harmless association between organisms. Reminiscent of such association is the condition of commensalism that exists between man and *Endamoeba coli*, in which the protozoan derives its food and place of abode without damage to man. Symbiosis is a condition, presumably developed from commensalism, in which the life of one of the organisms is conducive to that of the other and vice-versa. Such relationship is portrayed in the green hydra, whose color is due to the presence of microscopic plants (algae). Parasitism may be regarded as a condition, evolved from commensalism, in which one participant (the parasite) benefits by deriving its food and shelter, whereas the other participant (the host) experiences a loss. A condition of parasitism presupposes a physiological balance between the forms involved. We may represent the limits of this balance by two lines between which the normal lines of physiology of host and parasite must fall. When these two lines of physiology coincide with neither being moved from the normal, the condition of commensalism exists. When such condition is portrayed with the participants' lines of physiology inseparable, symbiosis is represented. In conditions of parastism the two lines of physiology never coincide. As the line representing the parasite approaches that of the host the latter is depressed toward its lower physiological limit for a distance determined by the severity of the parasite infestation. Host-parasite resistance is often seen in a one-sided light, namely, that of the host. As a matter of fact, conditions that depict resistance of parasites to hosts are generally interpreted in the negative to mean a lack or loss of resistance on the part of the host to the parasite. Parasitic disease is an entity manifested by the host, and brought about through an interaction between parasite and host. The production of host resistance or immunity against an agent of disease causes encroachment of the host's line of physiology on that of the parasite and may lead, ultimately, to the elimination of the disease-producing factor.

OUR knowledge of helminth immunity is very young. Whether or not present microbiological terms are applicable in this field is a matter of contention. Cameron (1934), of McGill Institute, considers immunity in an absolute manner, that is 100% protection to the host. The words, tolerance and premunition, are used by this author to denote relative conditions regarding immunty phenomena. Tolerance denotes a condition wherein the host harbors a given number of parasites without exhibiting manifest symptoms of disease. Premunition is used to depict the condition in which the host through auto-protection (resistance) cannot be made to harbor additonal parasites of a given nature. In the light of these terms immunity experimentally produced against helminths of mammals has been demonstrated rarely, if ever.

* Presented at the Seventeenth Annual Illinois Veterinary Conference, University of Illinois, Urbana, November 12-14, 1936.

[1] Assigned to the Division of Animal Pathology and Hygiene, University of Illinois.

WITH regard to artificial production of host resistance by far more success has been demonstrated with flatworms (trematodes and cestodes) than with roundworms (nematodes). Kerr and Petkovich (1935) injected seven rabbits intraperitoneally with 1cc of a 1% suspension of powdered adult fluke (*Fasciola hepatica*) material in physiological saline at intervals of one or two days over a period of three weeks until each animal had received a total of nine injections. Positive precipitin tests were secured at one, two and three weeks after the last injections. The experimental animals and three controls were each infested with thirteen metacercariae of the parasite 36 days after the last injections were given. Nintey-two days after infection four experimental rabbits were autopsied. One animal contained one fluke, two animals contained two flukes each, and the third harbored three flukes. Two additional experimental rabbits autopsied 103 days after infection yielded two flukes each. The last experimental rabbit which was autopsied 118 days after infection contained three flukes. The three control animals autopsied at 111, 116 and 124 days after injection harbored five, nine and 11 flukes respectively. As evidenced by fecal examination all of the flukes in the controls and none in the experimental animals produced eggs. Autopsy findings in the two rabbits of the first group that contained two flukes each are worthy of mention. In one animal one of the two flukes found was calcified, in the other animal both flukes were calcified. This phenomenon together with the inhibition of egg production brought about in the experimental rabbits is significant in regard to control through destruction of a link in the life cycle of the parasites.

H. M. Miller, Jr., and his coworkers from Washington University, have done important work on the production of host resistance in rats to the cysticercus or intermediate stage of *Taenia taeniaeformis*, the adult of which lives in the cat. In a long series of experiments these workers using injections of worm materials were able to produce significant resistance to this parasite. In one set of experiments almost complete resistance to this cysticercus was developed in the rats. Passive resistance was also demonstrated by the use of partially immune serum.

THE roundworms or nematodes are commonly thought of as being phylogenetically higher in the scale of evolution than are the flatworms. To say the least, greater structural differentiation and development are present in these forms. Whether or not this consideration is applicable here is a matter of little concern. However, more difficulty is experienced with regard to production of host resistance to this group than to the parasites of lower rank.

McCOY (1931), of the University of Rochester, found that, in a series of 18 dogs, repeatedly infested with the dog hookworm (*Ancylostoma caninum*), a significant amount of host resistance was developed which persisted for relatively short periods of time. In six cases of heavy infection the egg count rose rapidly during the first twelve weeks to a peak of several million eggs per day. The hemoglobin dropped to 25%. Out of a lot of six dogs, two succumbed to the infestations but the remaining four passed the crisis at this point. Host resistance in the latter was developed to the extent that large numbers of adult worms were passed in the stools. A significant drop in egg production by individuals retained in the intestine was noted even though large numbers of infective larvae were still adminstered to the dogs. Following the crisis the hemoglobin rose to normal. The author interpreted the throwing off of the adults in the feces, together with the resistance of the host to further development of larvae, to be a reaction of host immunity. After loss of the infections the dogs were subsequently infected a second and third time and in each case the worms were thrown off in the same manner as described above, but with greater rapidity.

Though, resistance was developed in dogs to the dog hookworm, it will be noted that it was produced by means of infection and

not by injection of suspensions of worm material. Stumberg (1930) was able to secure positive precipitin tests with serum from rabbits injected with an alkaline extract of hookworm material, but dogs similarly treated failed to react to the test above the non-specific level.

IF IT were possible to produce an appreciable amount of resistance, only to the tapeworms, much benefit would be derived. It is estimated (Graham, 1936) that tapeworms alone are responsible for 20% of the annual four-million-dollar poultry loss in Illinois.

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Hazards from Poisonous Plants

That there is danger of livestock poisoning from plant poisoning during extremely dry weather is common knowledge. Drought years are especially hazardous as cattle, horses, sheep, and hogs are ravenous for green feed of any kind and may eat large quantities of poisonous plants despite the fact that many are unpalatable. Even in seasons of ordinary rainfall it is estimated that stockmen whose herds graze on the unfenced ranges of the West lose from 3 to 5% of their animals from plant poisoning.

Animal Disease Control in Wisconsin

In Wisconsin a somewhat different plan of animal disease control is followed than in most other states. In our state, for the most part, we use properly qualified veterinary practitioners for the carrying out of a large portion of the various disease control activities, such as, Bang-testing, tuberculosis testing, and other duties. Under this plan, it has been found that the work can be performed most economically because there is a material reduction in travelling and hotel expenses. In addition to that, we find that a disease control program is accepted with greater confidence when the veterinarian located in a community is engaged in it. For the most part, the various communities in the state have a wholesome confidence in their veterinary practitioners. The fact of their participation in the program is sufficient to make it acceptable in the community. We find from a number of years of experience with this procedure, that veterinary practitioners doing work on disease control programs assume a high degree of responsibility. They carry out the work with great efficiency and in a conscientious manner. It is obvious that those who remain in the community and are present when ultimate results reveal themselves cannot help but feel the full weight of their responsibility. Veterinarians of Wisconsin have not only shown an eager desire to perform efficiently such tasks as may have been assigned them by the cooperative disease-control agency, but they have shown, even under greatly adverse circumstances a true loyalty and devotion to the work. This has raised the veterinary profession of our state in the esteem of livestock owners. The Department of Agriculture and Markets sincerely appreciates this loyal and efficient cooperation of the veterinary profession.—From the *annual report of the Director of Agriculture and Markets.*

Drugs Used In Veterinary Medicine

Introduction

By VICTOR LEWITUS, New York
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This is the first of a second series of discussions of materia medica useful to the modern veterinarian. It differs from the original dozen articles appearing in VETERINARY MEDICINE during 1935 and 1936 in many respects. The discussions in the latter treated chiefly of the prominent crude drugs and their preparations. The present discussion will deal, for the most part, with synthetic medicinal compounds.

Wherever possible, cultural aspects of the subject will be included, but because of the very nature of this phase of drugdom, the mode of treatment must vary somewhat from the original method of presenting the crude items.

As in the former series of articles, the facts here presented have been gathered from recent clinical findings or from that practice which has been most commonly accepted within the profession.

Each of the present series will be based upon the following plan or outline, whenever it may be applied to a certain group of drugs:

I. History of the group.
II. Compounds.
  a) Composition.
  b) Properties.
  c) Preparations.
  d) Therapeutic action or use.
III. Dose table (for members of group used internally).
IV. Toxic effects of the group.

I. Mercury

Historical Sketch.—In most art museums there is an interesting Greek statue which depicts a male figure with a winged head gracefully bending down at the foot of a tree. In his right hand he holds a wand around which a sleek snake winds itself several times. It is Mercury inventing the "caduceus"—the familiar emblem of our medical confreres. It was Mercury, the god of intellect, the patron of arts and sciences in ancient Egypt who was known as Hermes Trismegistus. He was considered the founder of alchemy, and in the Middle Ages this science was referred to as the "hermetic art." Our language of today still recognizes this deity in the term "hermetically sealed." The first record of the metal named after Mercury is found about 300 B. C. In its native condition, the peoples at that time referred to it as "argentum vivum" or living silver after which it obtained the name "quicksilver." Mercury which was distilled from cinnabar (its most common sulphide ore) was differentiated by the term "hydrargyrum" from which the chemical symbol Hg is derived. In records of Pliny the Elder, one finds an account of its occurrence in the treatment of certain skin diseases of a parasitic nature suffered by the grinders and potters of that remote period. It had been used in India and Arabia long before its introduction into European medicine. During the conflict of the herbalists versus the mineralists, Parcelsus brought the liquid metal into prominence. Some of the earliest known compounds were calomel, red precipitate (red mercuric oxide) and bichloride of mercury. The systemic use of the metal and its salts was quite general when venereal disease reached the European countries. By the time of Louis XIV, we find it definitely accepted as an anti-syphilitic. Following this, we find calomel and blue mass used as effective cathartics. Mercury is mined chiefly as an ore from Almaden (Spain) Monte Amiata (Italy), California, Texas, Mexico, Peru and Japan. When the cinnabar is roasted, it yields sulphur dioxide and metallic mercury. The latter is the only metal element that assumes the liquid condition at ordinary temperatures. In this form, it is ready for medicine (by redistillation, or it may be converted into numerous useful compounds by synthetic chemical treatment.

Compounds of Mercury

Native Mercury.—Metallic mercury itself enters into the preparation of such official products as *mercury with chalk* (gray powder), *mass of mercury* (blue mass), *oleate of mercury* (used in making the stronger mercurial ointment), *strong mercurial ointment* (50% mercury), and *mild* (30%) *mercurial ointment* (blue ointment). In place of the ointments, the plaster (30%) is sometimes employed.

Mercury and chalk is a mild cathartic, alterative and antacid. It is used chiefly in treating digestive derangements which are accompanied by diarrhea in young animals, such as puppies, calves and foals. Mass of mercury is a diuretic and cathartic particularly useful in canine practice to evacuate the bowel during the early stage of general infections, such as distemper. The ointments and plaster are resolvents and parasiticides, and therefore are useful in glandular swellings, synovitis and bursitis as well as certain skin diseases (eczema, tinea, mange, fleas and pediculosis). The milder ointment is usually indicated, and even then its use on cattle is to be avoided because of their susceptibility. In the case of poultry this preparation is popularly used by rubbing it into the feathers and the skin below the vent to rid the flock of lice.

Calomel—Mercurous Chloride (*HgCl*). —A white, odorless powder; insoluble in water, alcohol, ether; incompatible with alkalies, oxidizing acids and with soluble bromides and iodides, peroxide, iodoform, iodine, soap, lead, silver and copper salts. It must be kept in the dark since light will change it to a yellowish or grayish color.

It enters into the manufacture of compound cathartic pills, tablets of mild mercurous chloride, tablets of calomel and sodium bicarbonate; calomel ointment (30% calomel) and black wash.

Calomel is chiefly used, as is blue mass, to evacuate the bowels of dogs and cats in the early stages of infectious fevers, acting simultaneously as an antiseptic in the bowel. It thus has wide use in distemper, influenza and purpura. It serves a similar purpose in young animals that suffer from diarrhea or dysentery. It is also somewhat diuretic and is therefore used in dropsical conditions of hepatic or cardiac origin. When santonin is employed to expel round worms, calomel acts as a synergist augmenting its action. In the form of the ointment, alone or mixed with zinc oxide, it is efficient in treating subacute or chronic eczema. As a dusting powder it is useful in moist eczema, canker and foot rot because of its antiseptic and drying quality. It has been found to be superior for treating thrush in the horse when worked well into the commissure of the frog and retained. In habitual constipation, it must be noted, it is contraindicated especially in the case of cattle; in fact it should be followed by a saline purge when given to these animals. It was at one time thought that calomel is changed partially to bichloride of mercury in the stomach but this has been disproved. The fact is calomel is changed to a carbonate, oxide or hydroxide and in this condition produces mild irritation and acts as an antiseptic. By this irritation it becomes mildly cathartic.

Bichloride of Mercury—Corrosive Sublimate ($HgCl_2$.)—A heavy, colorless crystal or white powder, metallic taste, slowly soluble in water (1:13.5) and freely so in alcohol (1:3.8). Its solubility increases with the addition of sodium or ammonium chloride. It is incompatible with soluble alkalies, iodides, alkaloids and other organic compounds; and is decomposed by iron, zinc and other reducing agents. When concentrated, it is highly corrosive and toxic.

It enters into the manufacture of large poison tablets (8 grains), small poison tablets (2 grains), and yellow wash. These tablets are usually colored blue, have an angular shape, and contain ammonium chloride to render them easily soluble.

Mercuric chloride has some use internally as a tonic and alterative in small dosage, and well diluted. It is, however, chiefly used externally as an antiseptic or germicide, as a parasiticide and fungicide. It also has some value as an irritant and resolvent in spavin and fistula, etc. For general anti-

sepsis, the dilutions vary from 1:10,000 to 1:1000; and for germicidal effects the range occurs between 1:1000 and 1:500. Where there is danger of large-scale absorption such as from the vagina or bladder, dilutions down to 1:20,000 are recommended; and for other large cavities, the concentration should not exceed 1:5000. In cases of mange, pediculosis, and tinea 1:1000 alcohol or aqueous solutions are used but caution must here be sounded against absorption and habits of licking the part by the patient.

Ammoniated Mercury—White Precipitate ($HgNH_2Cl$).—A white powder, with earthy styptic taste, insoluble in water and alcohol. It is made by pouring a solution of mercuric chloride into excess ammonium hydroxide.

It enters into the official ointment which is 10% strength, too much for veterinary purposes. It is mainly used externally for chronic skin diseases, mange, herpes, pediculosis, etc., in 1% to 2% unguents.

Yellow Mercurous Iodide (HgI).—A bright yellow, odorless, tasteless powder, slightly soluble in water and insoluble in alcohol and ether. Incompatible with alkalies, salts of the halogens (chlorides, bromides, iodides), and oxidizing agents. It enters into tablets of yellow mercurous iodide. It has not been used to any extent in veterinary medicine, but may have some use in certain skin diseases. It must be kept in the dark.

Red Mercuric Iodide (HgI_2)—A scarlet, odorless and nearly tasteless powder; practically insoluble in water and slightly so in alcohol, soluble in solutions of iodides, sodium thiosulphate and hot alkaline chlorides. It enters into the making of tablets of red mercuric iodide; and the manufacture of Donovan's solution (an arsenical combination). It is considered as effective as mercuric chloride and is primarily used as an antiseptic, germicide and irritant. As an irritating embrocation or blister preparation it is used in treating affections of the bones, joints and tendons such as spavin, ringbone, tendinitis, etc. It must be stored in dark bottles.

Yellow Mercuric Oxide — (HgO).—A light orange-yellow, heavy, odorless powder with a metallic taste. Almost insoluble in water, insoluble in alcohol but readily dissolved by dilute hydrochloric and nitric acids. It is incompatible with cocaine hydrochloride (forming the bichloride). It is present in yellow wash, and enters into oleate of mercury (25%) and yellow mercuric oxide ointment (1%). This unguent must not come in contact with iron containers or instruments. This substance is to be preferred to the red oxide since it makes smoother preparations. It is an antiseptic and stimulant, being applied to chronic glandular enlargements, bruises, and chronic inflammation of the eyes such as granulated lids. It is also used to treat eczema and indolent ulcers. The usual strength is from 1% to 2%.

Red Mercuric Oxide—Red Precipitate (HgO).—A heavy orange-red powder, odorless with metallic taste. Almost insoluble in water, insoluble in alcohol, readily dissolved by nitric acid. Its action and uses are identical with yellow oxide of mercury, acting as an irritant and antiseptic. It is less popular than the yellow oxide because of its coarser nature.

Mercuric Nitrate ($Hg(NO_3)_2$).—This compound is important only for the official ointment known as "citrine ointment" containing 7% of the salt. In this form it is used as an antiseptic and irritant to treat chronic eczema (follicular mange), tinea, indolent ulcers, foot rot, etc. Diluted it is employed to treat corneal opacities.

Merbaphen—*"Novasural."*—A double salt of sodium-mercurichlorphenyl-oxyacetate, and diethylbarbituric acid (about 34% mercury equivalent). This is a white powder, soluble in cold water. This recently-introduced, official drug is being employed mainly as a diuretic in dropsical conditions of cardiac origin. It is contraindicated in acute inflammatory and degenerative disorders of the kidneys. For dogs the recommended dosage of the 10% solution is from 1cc to 2cc injected either intravenously or intramuscularly once or twice weekly.

However, tolerance should be determined by graduated doses. A drug similar in action and dosage, but unofficial is "salyrgan" (sodium hydroxymercuric-methoxy-propyl-carbamyl-phenoxy acetate). It represents about 40% of mercury. Mercuric salicylate and mercuric succinimide are official salts but are not, at present, used in veterinary circles.

Recent Non-official Compounds of Mercury

Metaphen.—The anhydride of nitro-hydroxy-mercuri-ortho cresol ($C_6H_2 \cdot CH_3 \cdot O \cdot NO_2 \cdot Hg$). A yellow, odorless and tasteless substance, insoluble in water and almost so in methyl alcohol, acetone, ether, aqueous sodium carbonate and bicarbonate; soluble in dilute aqueous sodium hydroxide and ammonium hydroxide. In alkaline solution, metaphen forms the sodium salt in which form it is actually employed. It represents about 57% mercury in combination. This complex compound is considered to be highly germicidal, more so even than mercuric chloride, certain other organic mercurial compounds, and phenol when tested against typhoid bacilli and staphylococci. Applied to the skin or mucous membranes it is relatively non-irritant especially when employed in proper dilutions. It is said to be relatively non-toxic, lethal effects from intravenous injections requiring .07 gm. per kilo in white rats. Aqueous metaphen solution occurs in three strengths. The 1:500 is recommended for oral use in small animal practice in gastric and intestinal infections, hemorrhagic enteritis, and intestinal distemper conditions. One teaspoonful either alone or combined with glycerin or milk of bismuth, three times daily is suggested. For intravenous use, the 1:1000 solution is employed. For large animal practice it is used to treat acute mastitis, septic uterine infections and pneumonia in cattle. For horses, it is indicated in cases of pneumonia, swamp fever, purpura hemorrhagica and navel ill. The dose suggested for these animals is 100-125cc every 12 to 24 hours until the temperature subsides. In small animals it is likewise used in pneumonias, complications following distemper, and generalized infections. The dose for dogs is 10-20cc repeated to effect. The 1:2500 solution is suggested for wet dressings or direct application to the eye, nose and throat. In this strength it is painless and non-irritant. For urethral irrigations as well as wounds and skin infections it may be diluted with equal volumes of distilled water. Tincture of metaphen is a 1:200 or 0.5% alcohol-acetone-aqueous solution. It has been found to be exceptionally potent for deep-seated skin infections and for general dermatological and surgical procedures. This form of the product is used in dermatoses of vegetable origin such as ringworm; as a germicide in amputations, ovariectomies and other operative procedure; to prevent stitch abscesses and secondary infections; to treat nail wounds by deep application; for dry and moist ear infections (with three parts of glycerin); and for corneal ulcers (combined with the anesthetic, butyn 2%). There is a colorless tincture for white dogs or other light colored animals. Metaphen is also prepared in the form of 1:500 ointment for local germicidal and prolonged antiseptic effect; a 1:3000 ophthalmic ointment for conjunctivitis, corneal ulcer, corneal opacity, blepharitis marginalis and keratitis. There is also a peanut oil form of 1:1000 strength for surgical and general use. Combined with ephedrine (1%) in 1:2500 it serves to shrink nasal mucous membranes in case of colds and sinus trouble. The drug serves also to disinfect rubber and metallic instruments.

Merthiolate.—The sodium salt of ethyl-mercuri-thiosalicylic acid. A light cream colored, crystalline powder, readily soluble in water and saline solutions, which mixes with soap and alcohol. It is incompatible with iodine, acids and salts of the heavy metals. It contains about 49% of mercury in combination. The therapeutic properties and uses resemble those of metaphen. However, in addition to being relatively non-toxic and non-irritant and affecting fungi and both spore-forming and non-spore-forming organisms it is claimed to accelerate healing. This is said to be due

to the sulphhydryl radicle that the merthiolate contains. For infected wounds and large cavity treatment, dilutions of 1:10,000 to 1:5000 of the aqueous preparation may be used. For skin infections such as pyogenic or vegetable parasitic conditions, the 1:1000 solution is indicated. For mucous membranes found in the nasal and sinus regions, as well as the ear a 1:5000 to 1:2000 solution is suggested. For preparing the eye for operations or ocular infections a 1:10,000 to 1:5000 strength is recommended. For urethral and bladder irrigation, a range of 1:30,000 to 1:5000 concentration is in order. The tincture of merthiolate, a 1:1000 alcohol-acetone-aqueous solution, the 1:2000 ointment and the 1:5000 ointment have similar applications to those of metaphen. The drug is much less toxic than mercuric chloride, rabbits tolerating as much as 25mg per kilo and rats as much as 45mg. per kilo.

Mercurochrome — Disodium-dibromoxymercuri-fluorescein.—Consists of irridescent, green granules or scales, odorless, stable in air; freely soluble in water; practically insoluble in alcohol, insoluble in ether and chloroform. Aqueous dilute solutions, fluoresce. It is incompatible with acids, alkaloidal salts and with most of the local anesthetics. Solutions stain the skin red and this can be removed by treating with sodium hypochlorite (chlorinated soda) or alcohol that has been slightly acidified with hydrochloric acid (about 1%) or with a little vinegar. Mercurochrome represents 25% of mercury in combination. Solutions are sterile in themselves and decompose on being boiled. The drug is a non-irritating moderately active antiseptic. Although the 2% aqueous solution acts more slowly than tincture of iodine, it has a more prolonged bacteriostatic effect. Because it is more rapid in action than the aqueous preparation, the 2% aqueous-alcohol-acetone solution is considered superior by most authorities. Mercurochrome has the significant peculiarity of penetrating into necrotic tissue. The drug is tolerated by most animals in from 1% to 2½% strength. The former for large surface exposure such as that of the genito-urinary tract, and the latter strength for eye, ear and related conditions. By intravenous route, toxicity tested on rabbits shows a tolerance of 25mg. per kilo. Dogs are even more resistant to the drug. In the human, no systemic effects have been recorded following local applications. Injected intravenously in fresh 1% aqueous solutions, it has some place in the treatment of septicemias and local infections. It appears to be more effective against the colon group of organisms than against staphylococci or streptococci, although some good results, even here, have been obtained. There have been some untoward effects after intravenous medication ending in prostration and collapse in humans. The veterinarian should exercise care in so using it.

The activity of the drug in the system is not well understood. It is not known whether there is a direct bacteriostatic effect or a non-specific effect traceable to the colloidal nature of the compound. Williams has determined that on horses, the 1% solution introduced into the jugular vein acted as a prompt cathartic and diuretic. He also found the 2% ointment serviceable in inflammatory conditions of the uterus. There was no visible local irritation nor general toxic effect. Dr. Glenn R. Browne uses a quarter ounce capsule of a 4% solution by inserting it into each uterine horn just before closing the uterus following cesarean-section in bitches. This precaution forestalls trouble and lessens the likelihood of death from septic metritis. Dr. E. B. Dibbell uses a 5% solution to swab out the birth canal of bitches following digital examination prior to delivery. Lacroix employs enteric coated tablets containing from 1 to 1½ grains in cases of infectious enteritis in cats six months of age or older. Davis has used it in treating running fits in dogs in about 4½ grain doses internally. When given by mouth, the feces are colored a deep red.

Meroxyl—Sodium dihydroxy-dihydroxymercuri-benzophenone-sulphonic acid. — A flesh colored or pink powder, easily soluble up to 10% in hot water, but in excess

of 2½% solutions when cooled will gelatinize. This substance is useful as a local antiseptic and germicide for superficial infections, but it is more irritant and toxic than mercurochrome. It acts even in the presence of serum and urine. It is mainly intended for wet dressings or irrigation of wounds or infected bladders. It is not to be used by injection but may be used topically in 0.1 to 0.5% solutions. In irrigating infected wounds or bladders, a 1:1000 solution is usually prescribed. Dogs are poisoned by intravenous doses of 2.5mg. per kilo, but half of this seems to be safe. Orally, the drug is less toxic; but vomiting and salivation may occur.

Potassium Mercuric Iodide (K_2HgI_4).—A complex salt formed from mercuric iodide and potassium iodide, and containing 25.5% mercury. Yellow crystals, deliquescent in air, soluble in alcohol and potassium iodide solution; when much diluted with water it precipitates mercuric iodide. This drug is close in properties and uses to mercuric iodide, except that it is more soluble. It is effective as a germicide since it does not coagulate albumin. It is used to disinfect the skin, instruments, excreta and discharges, and as an irrigation. The strengths range from 1:10,000 to 1:100. For irrigating wounds normal saline solution should be added for isotonicity.

Mercurophen — Sodium Oxymercuri-orthonitorophenylate.—A brick red powder, freely soluble in hot water, containing 53% mercury. It is a general antiseptic for skin and mucous membranes in 1:1000 to 1:5000, and for opthalmic work 1:10,000 to 1:15,000 solution.

(Mercuric benzoate, cyanide, oxycyanide, colloidal mercuric sulphide, flumerin, mercurol, mercurosal, and mercurettes are mainly used as antisyphilitics and thus have no application in veterinary medicine.)

Toxicology

Poisoning by mercurial compounds occurs when the drugs are absorbed through the skin or by way of the digestive tract. Sometimes cases arise when mercurials are used to disinfect stables. Cattle are often the victims since they are known to be especially sensitive. Fröhner reports a case of poisoning in a calf which had been treated for keratitis with calomel. The general run of symptoms of poisoning by mercurials are much the same, except that the bichloride and iodide produce corrosive effects and shock, before the general mercurialism sets in. There is depression, inappetence, rapid pulse, increased respiration and elevated temperature. Acute cases usually show prominent effects on respiration such as coughing, foul breath and signs of pneumonia. There may be nosebleed and pulmonary hemorrhage as well as intestinal bleeding. From local applications, there may follow itching, scab formation and loss of

Dose Table

Preparation or Compound	*Animal*	*Apothecary*	*Metric*
Mercury with Chalk (Gray Powder)	Foals	gr. x-xv	.6 -1.
	Calves	gr. x-xv	.6 -1.
	Dogs	gr. i-iv	.065-3
Mass of mercury (blue mass; blue pill)	Dogs	gr. ss-xv	.03 -1.
Mercurous chloride (calomel)	H	ʒi-ii	4. -8.
	C	ʒi-ii	4. -8.
	Sh+Sw	gr. xv-ʒi	1. -4.
	D	gr. ss-iss	.03 - .1
	Cat	gr. 1/6-3/4	.01 - .05
Bichloride of Mercury (mercuric chloride; corrosive sublimate)	H	gr. iss-iii	.1 - .2
	C	gr. iss-iii	.1 - .2
	Sh+Sw	gr. 1/6-1/3	.01 - .02
	D	gr. 1/12-1/6	.005- .01

hair. Harvey reports paralysis, salivation, muscular atrophy and marked abduction of the limbs from mercurial ointment, but these symptoms had been delayed for several weeks. On autopsy, the animal is found to have ulceration and extensive hemorrhage of the gastro-intestinal tract; the mucous membranes are edematous; the liver and kidneys are swollen and may show hemorrhage; the lungs likewise are hemorrhagic and show marked congestion; the skin and muscles appear anemic.

Treatment of mercurial intoxication is difficult in chronic cases, though acute cases may be treated more successfully. Where excess mercury is suspected in the digestive tract, proteins in the form of milk or eggs can be given provided evacuation be then secured. Rosenthal has just recently found that bichloride of mercury poisoning can be counteracted with sodium formaldehyde sulphoxylate. Of four dogs receiving 20mg. of bichloride per kilo by mouth and soon afterward given this antidotal treatment, all survived. Twelve dogs received 25mg. as above; and both oral and intravenous doses of the antidote were given 40 to 90 minutes later. Nine of the twelve dogs survived. This worker found that both the oral and intravenous channels are necessary. The sodium formaldehyde sulphoxylate when given orally reduces the mercuric chloride in the stomach and the intestine immediately, while the intravenous injection serves to intercept the mercury in the tissues and prevents kidney damage. He advises, as a first step, lavage with a 5% solution of the antidote. Hug *et al* report this to be the best of all methods thus far advocated. Hyperhydration and anti-ketosis therapy must supplement this form of treatment.

[EDITOR'S NOTE: This is the first of a new series of twelve articles by Professor Lewitus. The second installment of this series will appear in an early issue. In the former series, published in 1935, the following drugs were discussed: Nux Vomica, Digitalis, Tannic Acid, Betel Nut (Arecoline), Santonica (Santonin), Physostigma (Eserine), Aloes, Eucalyptus, Terebinthina, Jaborandi (Pilocarpine), Iodine and Belladonna (Atropine).]

The Lure of Indemnities

The payment of indemnity for ailing animals to protect public health may act as a boomerang in disease control. It's a kind of governmental paternity that may put a premium on bad management. Anyhow, it seems to be coming to pass that owners of animals not only expect free veterinary service but also pay at market prices for the animals found to be diseased. At the Twelfth International Veterinary Congress, Leclainche pointed out the danger of this political trend. Disease control in the interest of both national and individual welfare should begin by careful husbandry on the farm, not with public interference under duress or the lure of indemnity. Only a well-disciplined and sufficient private veterinary service cooperating with public officials will accomplish the purpose. Otherwise, the control of animal diseases as a public health measure, can become quite a racket, in spite of the best intentions.

The present federal and state Bang's disease eradication project offers some illuminating illustrations. In some states perhaps many of them, herd owners were advised to have their herds tested privately before they signed the contract and if reactors were found that it would be unprofitable to dispose of for the amount of indemnity, not to have an official test. In other states the practice of tearing up the contract and forgetting about the test was followed, if it picked out animals the owner was unwilling to dispose of at the indemnity price. In no instance that we have heard of were any punitive measures invoked against the herd owner who refused to dispose of reactors, unless discontinuing a service the farmer no longer wanted can be called a punishment. The ultimate success of disease control measures of this sort is open to serious question. The future cooperation of herd owners, who began disease eradication with the objective of exchanging unprofitable animals for an indemnity may be jeopardized in some instances when such owners have no more diseased animals to sell the government for more than they are worth.

Allotriophagia in a Boston Terrier

December 29, 1936 at 8 P.M. a four-month-old, female Boston terrier was presented at the veterinary clinic of the Kansas State College. The pup had been observed by the owner swallowing a large headed pin, about one-half hour previous to her arrival at the clinic.

By the aid of the fluoroscope, the pin was located in the stomach and in addition, what appeared to be another foreign body was observed in approximately the same position, consequently a radiograph was decided upon. The animal, which weighed 9¾ pounds, was given 2cc of nembutal intravenously (right external saphenous vein). When narcosis was complete the animal was laid on its side, the fore and hind legs drawn forward and backward respectively and a radiograph made. (Settings were: A.T.4; M.A.10; Distance 25"; Exposure time ¼ sec.; G.E. Model "D".)

The radiograph (fig. 1) showed the pin and the other foreign body which appeared to be six nails and seven buttons. Immediate gastrotomy was decided upon.

The animal was placed on the operating table in dorsal recumbency and the operative area, which extended from the umbilicus three inches anteriorly, was shaved and disinfected with a 1:1000 alcoholic solution of mercury bichloride. The animal being still under the effects of the nembutal previously administered it was necessary to give only an occasional inhalation of ether. The clinician in charge was Dr. E. P. Leonard.

An incision one and one-half inches long was made through the skin, muscle and peritoneum on the mid-line about one inch anterior to the umbilicus. The stomach was located and the greater curvature exposed through the abdominal incision. Tampons of sterile gauze and a large white cloth were packed around the exposed portion of the stomach, so as to prevent contamination from its contents when the stomach was opened. An incision one inch long was made in the wall of the stomach, parallel to the greater curvature and so located as to avoid the larger blood vessels. Through this incision the contents of the stomach were removed. When the correct score was taken it was found that

Radiograph of the stomach of a Boston terrier, containing seven toy automobile wheels, nine nails, one pin and a piece of rubber.

the animal's stomach contained seven rubber wheels such as are found on little toy automobiles, nine steel nails of the type commonly used to hold such wheels in place, one large headed straight pin and a piece of rubber, apparently torn from a bathing cap.

The incision into the stomach was closed with two rows of Lembert sutures using gastro-intestinal chromic catgut No. 0. The first row of sutures was continuous and the second interrupted. The muscles and peritoneum were drawn together with interrupted sutures using No. 2 plain catgut. The skin incision was closed within three modified mattress sutures using No. 10 braided silk. A dry sterile pack was placed over the wound and held in place with a two-inch, gauze bandage. Before the animal was removed to its quarters, 20cc of a 50% glucose solution was administered intraperitoneally to shorten the period of narcosis and act as a general stimulant.

The patient was given neither food nor water until 6 o'clock the next evening and from then on for the next four days it was given only small portions of nutritive broths and milk. When bulky foods were fed they were of the soft and easily digestible type. She made an uneventful recovery and the skin sutures were removed on the fourth day.

When the owner was shown the objects obtained from the pup, she recalled that such things had been missing from her child's toys for a period of two or three weeks prior to the pin incident. The pup had been observed at various times chewing on the aforementioned toys but had not been suspected of swallowing the parts. From this history it is judged the pup had been accumulating this material for a period of two to three weeks.

Such cases as this one are not unusual. The veterinarian is often called upon to treat young dogs that have swallowed indigestible substances either in play or because of some nutritional deficiency. In this particular case the owner was advised to add one-half teaspoonful of steamed bone to the daily ration.

The problem which arises with these cases is to determine the type of nutritional disturbance, if any, and how it can be overcome.

F. Monroe, K. S. C., '37.

Manhattan, Kans.

* * * *

Historic Dates in Bacteriology

In 1871 Carl Weigert succeeded in staining bacteria and in 1874 introduced aniline dye stains. There continued, however, to be great skepticism on the subject of the alleged relation of bacteria to infectious disease until Pasteur, in 1877, by his anthrax researches, demonstrated the truth of the germ theory. This broke the opposition to a considerable degree and started a long line of achievements, the most outstanding of which, all satisfying the postulates of Koch, may be listed by years—down to the end of the nineteenth century—as follows:

1876. Anthrax: bacillus demonstrated (in man) by Koch.
1877. Malignant edema: Pasteur and Joubert.
1880. Trypanasomiasis: the trypanosome discovered by Evans. Furunculosis: Staphylococcus (Pasteur). Septicemia: Streptococcus isolated by Pasteur.
1882. Glanders: Löffler, Schütz, Bouchard, Capitan, and Charin. Tuberculosis: Koch.
1883. Erysipelas: Fehleisen.
1884. Tetanus: Nicolaier.
1886. Bacillus coli infections: Escherich.
1887. Malta fever: Sir David Bruce.
1889. Texas fever: Theobald Smith.
1896. Botulism: Van Ermengem's bacillus botulinus.
1898. Foot-and-mouth disease of cattle: Löffler isolated the virus from vesicles.

* * * *

It is unpleasant for the inspector in charge of the Bang's disease control work to see a man sign up for the project and in a short time be put out of business unexpectedly. There is nothing that is so disturbing as to see a man put out of a business overnight when he least expects it.

—*J. J. Lintner.*

Filterable Virus Diseases of Fowls*

By C. A. BRANDLY, Urbana, Illinois,
Associate Pathologist,
State Department of Agriculture[1]

THE group of filterable virus diseases to which poultry is subject is no less imposing nor destructive than that affecting domestic animals and man. The autopsy diagnoses upon diseased poultry received at the Animal Pathology Laboratory, University of Illinois, during the six-year period from 1931 to 1935. (*Vet. Med.* 31:3, March, 1936, pp. 114-124) show that the incidence of filterable virus disease represents 22% of the total and is exceeded only by the bacterial and parasitic disease groups. Fortunately, such serious virus infections as fowl plague and Newcastle disease do not exist now in this state nor in this country.

Of the three most important diseases of the virus group affecting poultry in Illinois, leucemia or leucosis has been the most prevalent, representing 10% of all cases and approximately 50% of all outbreaks due to filterable viruses during the six-year period. (The term leucemia is interpreted broadly here to include various forms of leucosis or leucemia, sarcoma, fowl paralysis and leucemia-like conditions.) Laryngotracheitis was diagnosed in approximately 7% of all the birds examined and fowl pox in 2% to 3%.

The term roup is applied to a non-specific group of infections which perhaps represented two or more virus infections occurring alone or in association with various bacterial pathogens. Recent studies have established the identity of an infectious bronchitis[1] distinguishable from laryngotracheitis. The possibility of an infectious virus coryza also, cannot be overlooked at present.

The Filterable Virus Agents.—In spite of recent advances in the study of the virus-disease agents many fundamental problems remain unsolved. Authorities disagree as to the nature of the transmissible agent of leucemia, although differences among strains of leucemia are recognized. Differential filtration and centrifugalization methods reveal physical differences among various viruses.

Fowl pox, long classed as a filterable virus disease, is marked by the relatively large size, .125-.175 microns (see illustration) and tenacious character of its inciting agent (Borrel body) which allow it to pass through only very coarse filters. Infectious laryngotracheitis is definitely associated with a relatively large filterable virus. The virus of infectious bronchitis readily passes filters so fine as to retain the virus of laryngotracheitis.

Important differences in resistance to destruction by chemical and physical agents are recognized and these influence the nature and efficiency of certain disease control measures. It is known that fowl-pox virus is generally far more resistant to drying, light and disinfectants than the agents of infectious laryngotracheitis and infectious bronchitis.

Pathogenic Effect and Differential Diagnosis

Leucemia.—This is a disease of numerous types which may or may not manifest blood changes and which may involve almost any part or tissue of the body. The result is a great diversity or variety of symptoms. The pathogenic effect of the disease agent is observed in the growth of bone marrow cells. Stimulated to exuberant growth these cells are carried into the venous circulation where accumulations (leucostases) occur, particularly in the organs or tissues having a vast capillary network. Changes of the spleen, liver, and bone marrow are, therefore, common—these changes being associated chiefly with pressure atrophy and not with inflammatory alterations. The highly variable symptoms associated with an acute or a chronic course further complicate diag-

* Presented at the Seventeenth Annual Illinois Veterinary Conference, University of Illinois, Urbana, November 12-14, 1936.

[1] Assigned to the Division of Animal Pathology and Hygiene, University of Illinois.

nosis. Consequently the examination of three to four or more birds from a suspected flock is usually necessary to incriminate or eliminate the presence of leucemia.

In chronic cases, emaciation is seldom so extreme as in advanced tuberculosis, while the lymphoid-like masses differ in color, and consistency and seldom show the caseous necrotic core of tubercles. The skin may bleed easily. When pulled the feathers may appear bloody. Hemorrhages in breast and thigh muscles are not uncommon. The bone marrow is frequently altered—swollen, pale grayish and so firm as to allow removal *en masse*.

Cellular infiltration of the nerve trunks, central nervous system and iris of the eye lead to a variety of manifestations including lameness, paralysis, "grey eyes," etc.

Fowl Pox.—Fowl pox of the skin of chickens seldom presents a differential problem. In turkeys more swelling and granulation may occur than in the fowl. So-called canker, avian diphtheria or the "wet" or mucous membrane form of fowl pox usually can be distinguished from laryngotracheitis by the greater involvement of the mouth and pharynx and the adherent lesions of the larynx and upper trachea in the former.

Infectious laryngotracheitis is usually more rapid in its course than avian diphtheria associated with fowl-pox virus. Furthermore, the dissemination of laryngotracheitis throughout the flock or unit is invariably more rapid. Clinically it is frequently indistinguishable from coryza and infectious bronchitis and may require bacteriological and immunological differentiation. However, coryza tends to be limited more to the head and its structures. Virus bronchitis usually shows greater affinity for bronchial and pulmonary tissues which phenomenon may, however, be imperceptible on gross examination. Extensive laryngeal and tracheal casts are present usually only in laryngotracheitis.

Control Measures.—These must be based on proper sanitary and management practices.

Of the virus diseases mentioned, only certain strains of leucemia are apparently transmissible through the egg. However, the "carrier" problem is a major one in controlling these maladies. Birds having been exposed to or having recovered from the virus diseases are potential carriers of

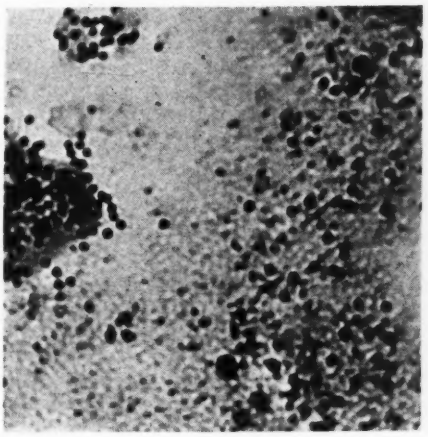


Fig. 1. The black spherical bodies (Borrel bodies) resembling cocci represent the infective elementary bodies of fowl pox. X200.

the infection or infections for an indefinite period. Preventive vaccination against fowl pox and laryngotracheitis has been practiced with considerable success in affording protection against the carrier hazard as well as in flocks or areas where exposure to other sources of these infections is continually imminent. However, vaccination against these two diseases creates certain hazards inseparable from the use of living, unattenuated viruses.

Apparently, disposal of stock exposed to, or having recovered from an outbreak is essential to eradication of laryngotracheitis and bronchitis infection. These viruses are relatively non-resistant to cleaning and disinfection measures.

Leucemia control measures, according to our present knowledge, are dependent upon careful culling associated with proper sanitary measures and the judicious selection and maintenance of resistant breeding stock. Frequent rigid culling of the flock wherein the disease has appeared tends to

eliminate not only the affected individuals in the early stages but also the weak individuals. Because of the wide prevalence of leucemia, selection of stock to replace flocks decimated by the disease or to establish new flocks, should be made from sources of high vigor, known to possess resistance to this disease.

Because of the scope of the filterable virus diseases of poultry, attention is called to the various circulars and bulletins devoted to the specific diseases of poultry which are available on request from this Division, from other experimental stations and from the United States Department of Agriculture.

Reference

1. Report of the Special Committee on Poultry Diseases, 73rd Annual Meeting of the A. V. M. A., *Jour. A. V. M. A.*, Oct., 1936, 89:4, pp. 449-50.

An Acardiac Amorphus as Found in a Cow

The presence of a placental acardiac amorphus, as found in bovine obstetrics, is sufficiently a novelty in general practice and veterinary literatue to warrant attention. The importance is not so much because of physical damage incurred to the dam, or the fetus, but rather that one may be able to recognize and explain the presence of such an abnormality.

An acardiac amorphus, as defined by Dorland, is: "A monster fetus, usually parasitic, having rudimentary head, extremities and other body parts." This acardiac amorphus may be a teratoma, which is a tumor containing fetal remains congenitally derived, such as teeth, hair, etc., generally supposed to be due to the inclusion of an abortive fetus within one which develops normally, or an autochthonous teratoma, which is a teratoma, the tissues of which are not necessarily formed by the inclusion of another individual. Williams, in "Veterinary Obstetrics," states: "An acardiac amorphus is apparently the result of unequal fission; it is attached to the navel cord of the approximately normal fetus, the heart of which sustains the circulation of the monster." He also states: "Such an acardiac monster, which usually becomes detached during parturition, sometimes consists of an almost complete sphere covered wtih hair; sometimes the exterior is calcareous."

On December 17, 1936, Dr. E. J. Frick, of the Department of Surgery and Medicine at the Kansas State College, received from Mr. E. H. Coes, herdsman at the Colby (Kansas) Agricultural Experiment Station, for identification such a specimen as has been described (see illustration). This amorphus was found by the herdsman, attached to the placenta of a cow which gave birth to a normal calf.

The abnormality was spherical, approximately 10cm in diameter and entirely covered with hair, except for its attachment. Upon sectioning, no embryonal structures could be identified, except that there was present both striated and unstriated muscle tissue, cartilagenous tissue and two cavities with membranous lining, also a quite definite circulatory system of arteries, capillaries and veins.

WALTER W. FECHNER, K. S. C., '37.
Manhattan, Kans.

A recent outbreak of trichinosis in man in Montreal has attracted attention to this parasitic infection and its relation to meat inspection. Sixty-eight known cases of trichinosis in human beings occurred. The origin was traced to products intended to be eaten without cooking, which had been distributed by a local firm whose main supply was country-bred hogs.

Eversion of the Urinary Bladder

A black, grade, Percheron mare was presented at the veterinary clinic of the Kansas State College on November 19, 1936, with the following history.

On June 15, 1936, at 8:00 o'clock in the morning the mare was seen straining in an apparent attempt to foal. A "self-styled veterinarian" was called and the foal was delivered dead at 11:00 o'clock.

In a short time an enlargement about the size of a cocoanut was seen protruding though the lips of the vulva. The quack dismissed this by saying that it was merely the "womb" and would retract in a short time.

Time disproved this, for the enlargement was in reality the urinary bladder. It was seen to retract, at least into the vagina, at times, until June 22; from that time on it remained exposed.

The owner stated that he had kept the bladder covered with a cresol compound during the summer months and on October

Fig. 1.

10, 1936, presented the mare to two veterinarians for examination and treatment. The bladder was cleaned, disinfected, and an attempt at inversion made. Both men pronounced the case beyond correction as far as they were concerned and advised that the mare be taken to the veterinary clinic of the Kansas State College for treatment, or destroyed.

Upon examination at the clinic the bladder wall was found to be thickened; the exposed mucous membrane was bleeding, and some infection present. (Fig. 1.) Urination was accomplished with difficulty and straining; at frequent intervals, through the orifices of the ureters; streams of urine often spurted six feet to the rear of the animal. Between these intervals the urine would steadily ooze from the ureteral orifices.

In an attempt to soften and reduce the size of the bladder it was massaged daily for two hour periods with sucrose, after which inversion was attempted without success, although reduction in size was accomplished to a considerable degree. Pressure bandages of gauze, elastic wool and

Fig. 2.

adhesive tape were applied between periods of massage.

After ten days it was decided that inversion was impossible and that amputation was the only recourse.

The bladder was cleaned, disinfected, and held straight back from the body. Flexible probes were inserted into the ureteral orifices to be sure that the ureters were not included in the sutures. A line of mattress sutures of umbilical tape, doubled and treated with tincture of iodine were placed obliquely across the bladder extending from a point about one inch posterior to the ureteral orifices and ending at a point just above the inferior commissures of the vulva.

The fundus portion of the bladder was then removed. The line of incision was about one-half inch posterior to the line of sutures. Hemorrhage was controlled by

the use of artery forceps, and ligation of the large vessels.

The remaining portion of the bladder was treated daily with a mixture of one part campho-phenique and three parts mineral oil. The same procedure was carried out on each of the five days following. On the sixth day the portion of the bladder posterior to the line of sutures was removed. Each day the remainder of the bladder was replaced in the vagina with the hope that it would eventually be retained there. When the mare was sent home on December 7 she was urinating without any apparent difficulty. On January 20, or approximately six weeks later, the owner reported that the mare was doing nicely, had gained weight, stood and walked normally, and retained the bladder within the vagina at all times, except when urinating.

Figure 2 shows the serous coat of the amputated portion; indicating the extreme thickening of the wall of the bladder and the impossibility of inversion. In fact it was impossible for two men to invert even the amputated portion.

True eversions of the bladder in the mare are rare in this clinic, since in the past 30 years this is the only case that has been recorded.

C. W. BURCH, K. S. C. '37.

Manhattan, Kans.

So-called Negative Phase Following Vaccination

In a recent communication to the veterinary academy of France, G. Ramon and A. Staub, well-known scientists of the Pasteur Institute of Paris, discredit the popular notion about the so-called *negative phase* during which vaccinated subjects are thought to be made more sensitive to the infection against which they are being vaccinated. The authors pronounce the prevailing idea "a false interpretation conveniently employed to mask accidents due to inefficacy or excessive virulence of the vaccine material employed.

"In reality," these authorities declare, "between the moment of injecting a vaccine and the appearance of immunity therefrom, the vaccinated subject is no more nor no less sensitive to the infection." They, however, point out the importance of shortening the period during which vaccinated subjects are not immunized.

Indiana Veterinarians Meet

The annual meeting of the Indiana Veterinary Medical Association was held in Indianapolis, January 19-21, 1937.

On the following page are halftones of some of the members and visitors in attendance at the meeting, their names and addresses being, left to right:

Top row: H. J. Gray, Kirklin; Roe King, Sheridan; Raymond Gurley, Roanoke; C. W. Fisher, Royal Center; O. B. Curry, Morristown; J. E. Carrico, Bicknell; C. C. Tucker, Warsaw and W. B. Craig, Indianapolis (Secretary).

Second row: J. O. Riester, Indianapolis; C. O. Bowland, Amboy; G. M. Blubaugh, Thorntown; L. O. Fish, Spencer; T. L. Steenerson, Wilkinson; J. L. Hetherington, Bloomington; H. C. Wilson, Muncie, and F. C. Tucker, Claypool, President 1936-7).

Third row: A. S. Einoris, South Bend; H. J. Weaver, Hagerstown; H. H. Yocum, Freelandville; Chas. C. Dobson, New Augusta; V. H. Cooper, Tipton; R. D. Chew, Covington; J. J. Sharp, Vevey, and R. A. Craig, LaFayette.

Fourth row: W. A. Heck, Knox; H. A. Lidikay, Darlington, Mr. A. E. Adler, Cincinnati, Ohio; F. A. Hall, Garrett; C. E. Call, Roachdale; F. R. Bartlow, Indianapolis, E. E. Boles, Warsaw, and T. A. Sigler, Greencastle.

Fifth row: G. J. Behrens, Evansville; W. E. LeCroy, Fairfield, Ill.; W. H. Dean, Elwood; L. E. Andres, Remington; P. T. Engard, Marysville, Ohio (guest speaker on program); C. R. Baumgartner, Spencerville; E. A. Tucker, Columbus, and W. J. Armour, Goshen.

Sixth row: H. Fairfield, Monticello; A. C. Spivey, Thorntown; D. I. Scudder, Patriot; D. O. Turner, Franklin; O. K. Young, Noblesville; O. G. Jaynes, Lewisville; W. B. Massie, Boston, and A. R. Theobald, Cincinnati, Ohio (in charge of small animal clinic).

Seventh row: H. L. Decker, Boston; G. W. Bardens, Lowell; L. A. Wood, Greensburg, Payson Schwin, Elkhart; C. H. York, Fort Dodge Laboratories, Indianapolis; Mr. F. V. Hawkins, Pitman-Moore Co., Indianapolis; Mr. J. S. McLaughlin, Abbott Laboratories, Indianapolis, and H. Meade Hamilton, Muncie.

Eighth row: J. E. Dobyns, Franklin; D. C. Hancock, Mays; Fred E. Catt, Arlington; Chas. J. Gruber, Fort Wayne; J. L. Craver, Richmond; G. W. Gillie, Fort Wayne; J. E. Gibson, Indianapolis, and Col. C. W. Greenlee, Ft. Jay, N. Y. (guest speaker).

Impaction in the Horse

Because of our recent severe drouths and the advanced age of our horses, impaction is almost an everyday occurrence in my practice. It is a fecal ball impaction, occurring in the posterior part of the large colon, small colon and rectum. Cecal and small intestinal impactions occur, but colon and rectal impactions are far more numerout in this locality.

Cause.—Poor feed, such as woody sweet clover hay, threshed sweet clover, corn stalks, insufficient water, inadequate salt, poor teeth, old age, debility, etc.

Symptoms.—The owner first notices his horse gradually going off feed and refusing water. The animal appears somewhat depressed. Colicky pains come on at intervals. The longer the case continues, the more frequent the peristalic pains. A horse may protrude the penis or mare may strain in urinating. The urine is scanty at each straining period.

Treatment.—Rectal examination should be made in all cases of colic, for confirmatory purposes. Many cases of impaction have been lost that could have been saved with massage and pressure through the rectal wall. There are any number of these cases in which medicinal agents alone are unavailing. Proceed to break up the fecal mass through the wall of the rectum. Inject a pint or so of oil into the rectum. Lubricate the hand and arm well with liquid petrolatum or linseed oil and insert gently into the rectum, feeling the way cautiously. After passing over the floor of the pelvis, extend the arm and hand anterior and to the left. In impaction of the colon, the fecal ball is located anterior, ventral and to the left. After locating the fecal mass, try to pick it up or manipulate it to the floor of the pelvis or to the brim of the pelvis. After getting the mass in this location, start to massage and apply pressure, being cautious not to rupture the intestinal wall. It is surprising how much pressure can be applied on the intestinal wall without rupturing it. Medicinal treatment is, of course, always administered in combination with rectal massage. The medicaments used are: aloes bolus, liquid petrolatum, linseed oil, magnesium sulphate and, if no bloat is present, arecoline. Plenty of water, six to eight gallons, twice daily. Anodyne and antiferment treatment to allay the pain and prevent bloat are administered.

Impaction with flatulence is a very serious condition. The bloat will often kill the horse before the impacted mass can be expelled. When bloat is present, it is difficult to locate the impacted mass. We then resort to the trocar, which lessens the difficulty in locating the fecal ball per rectum.

Cecal impaction can be treated the same way, but water, magnesium sulphate, oils, etc., are very essential, along with enemas and massage.

Impaction of the small intestine is generally fatal.

W. B. REDMAN.

Dow City, Iowa.

* * * *

Treatment for Impaction of the Colon

On February 5, 1937, I was called to see a gelding, ten years old. My diagnosis was obstruction at commencement of the floating colon. Respiration was 25; temperature, 102°F., and pulse, 42.

I gave the following treatment: Colic anodyne, six drams in capsule; purgative elixir, six drams; arecoline, one grain; saturated solution of magnesium sulphate, 20cc, hypodermically. In one hour the animal had not improved, so I repeated the medication, with one-half grain eserine salicylate; also 20cc of saturated solution of magnesium sulphate and two and one-half gallons of warm water with two ounces of chloral hydrate in solution as an enema.

In 20 minutes the animal passed a phytobezoar, six inches in length, four inches in diameter and 12 inches in circumference. Marked improvement was noted in a half hour.

The next day the owner brought three more balls, slightly smaller, to my office. I have the first one in a glass jar in antiseptic solution. The patient recovered.

J. F. ABEL.

Columbus Junction, Iowa.

Jugular Phlebectomy in a Horse

The following case occurred recently in the practice of Doctor J. E. Weinman of Lincoln, Nebraska. The animal was a four-year-old, thoroughbred mare with a hemorrhage from the right jugular, and a suppurating wound in the skin and surrounding muscles over and near the jugular. The etiology of the condition was not learned but Doctor Weinman thought it due to a perivascular rather than an intravenous injection of some irritating drug.

The mare was emaciated; her head hung to the ground; the pulse was barely perceptible; respirations were shallow and fast; the temperature was slightly above normal. A mild diarrhea also was present.

An extensive phlebitis had occurred, as the wall of the jugular vein was more than twice its normal thickness and contained a thrombus which filled the lumen of the vein from the temporo-mandibular articulation to the thoracic inlet.

The jugular was ligated in two places and the wound in the skin cleansed with a 10% solution of therapogen. Twice a day one quart of syrup and four gallons of normal salt solution were administered by means of the stomach tube. Supportive treatment consisted of two ounces of tincture of nux vomica and two drams of tincture of digitalis, twice daily. The mare showed improvement in three days.

Two days after the jugular vein was ligated, the nose, pharyngeal region, neck and pectoral regions became edematous. As a result of extreme swelling, marked dyspnea developed, consequently a trachea tube was inserted. Insertion of the tube presented some difficulty because of the intense swelling of the tissues but it provided immediate relief to the patient.

Multiple abcesses developed along the course of the jugular vein and in the region of the parotid gland and masseter muscle, all were opened and drained. Also a sling, in the form of a hammock made from a sack was devised to prevent the mare from lowering her head.

A jugular phlebectomy was decided upon to save the life of the animal. Three areas were prepared for the operation; one being immediately inferior to the temporo-mandibular articulation; one at the thoracic inlet; and the existing wound in the middle of the neck serving as the third. These areas were shaved and cleansed with alcohol and then painted with tincture of iodine. Anesthesia was obtained by infiltrating the skin with a two per cent solution of procaine along the course of the jugular vein.

An incision was made in the upper area and the jugular ligated in two places and severed between the ligations. By blunt dissection the vein was isolated from the surrounding fascia. Ligation was then made at the thoracic inlet and the jugular removed from this incision. The incisions were not sutured but left open to provide drainage.

The wound healed in about ten days and the dyspnea was relieved and the trachea tube removed. The mare was fed a bran mash containing syrup. In four days she had gained sufficient strength to support her head without the sling and to move about.

The left jugular vein has increased in size so much that it is plainly visible, while on the right side a slight depression can be seen at the thoracic inlet of the jugular furrow.

Six weeks following the operation, the mare developed a fistula of the withers. This was opened and drained in the customary manner.

At the present time, two months later, the mare is apparently normal and is able to work as usual. The scar is not particularly noticeable.

H. F. HUBBARD, K. S. C. '37.
Manhattan, Kans.

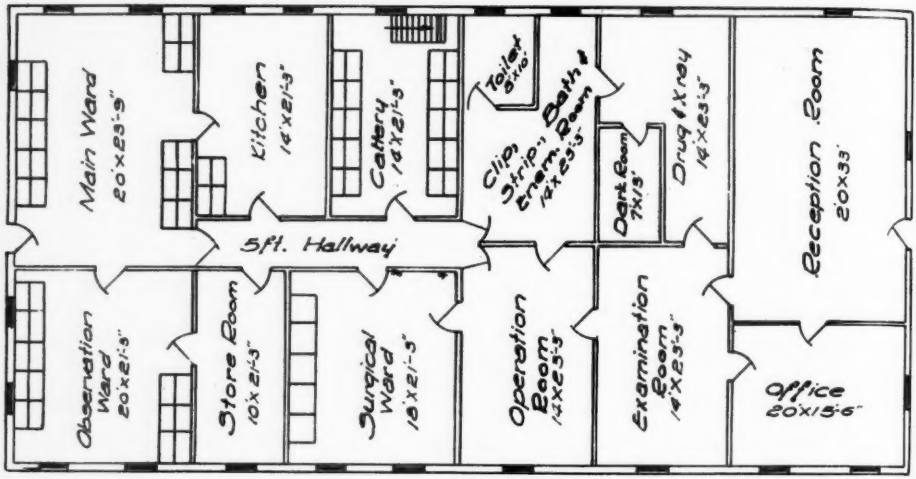
High Prices for Horses

Thirty-seven horses sold at auction recently by R. E. Moreland brought $45,770—an average of $1,210 a piece. At this sale John Cook, Spring Lake, N. J., paid the top price for a stallion—$6,000, and B. P. Eddie, Shelbyville, Ky., paid top price for a mare—$3,000.

A Model Hospital for Small Animals

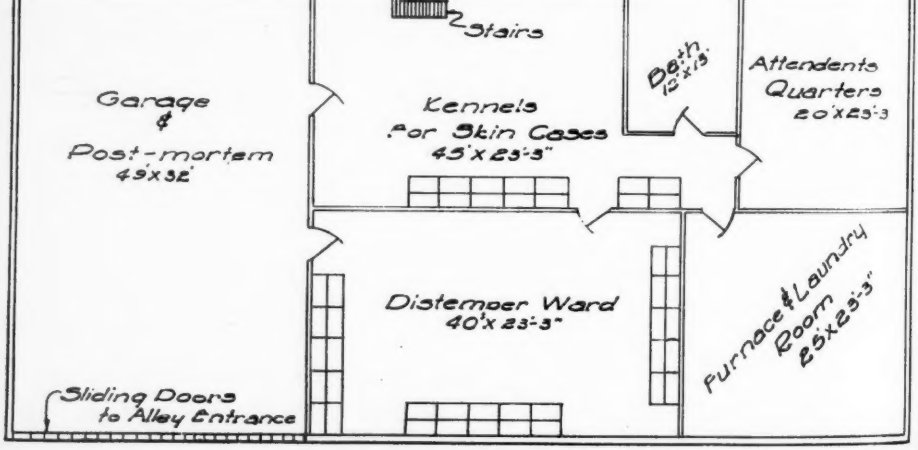
A small animal hospital should have at least six wards comprised of an observation, surgical, cat, distemper, mange and main ward. Lacking any one of these wards, a small animal hospital would lack adequate facilities to give its cases proper attention. An office, a pharmacy, waiting room, examination room, surgical room, x-ray room, attendant's room, boiler room, enema and clipping room, store room, kitchen and garage are essential to a complete plan.

A small animal hospital should have no waste space; every square foot of its interior should be of use. To attain this in the plan shown herewith, a short hallway leads from the surgery and enema room



MAIN FLOOR PLAN

Bldg. 50'x100' Outside



BASEMENT PLAN

back to the main ward. The various other rooms have been allotted the space and location suited to their intended purpose, with the conservation of space always the main factor. A basement below the main floor includes the garage, attendants room, boiler and laundry room, and the mange and distemper wards. With the main floor and basement so arranged, a complete small animal hospital may be housed in a 50x100 foot structure.

In regard to arrangement, a small animal hospital must be conveniently arranged to save as many steps as possible during a day's routine. In this plan the reception room is readily accessible from the front entrance and also from the office. The examination and operating rooms are located directly opposite the pharmacy, x-ray, clipping and enema rooms, making these rooms readily accessible to each other. The operating room opens into the surgical ward. The kitchen across is centrally located to serve the main ward, observation ward, surgical ward and cat ward, and near the stairway to serve the basement wards. The store room is near the kitchen.

The workableness of this plan may be visualized by tracing with a pencil a small circle tour from the office through the reception room, pharmacy and x-ray room, clipping and enema room, operating room, examination room, back to the office. This group of rooms is so arranged that the busiest zone of the hospital is as conveniently accessible as if it were one large ward. A small hallway lessens the steps between the wards, kitchen, and store room, and opens with the main ward out into the exercise yards. A stairway to the mange ward and other installations in the basement is centrally located. The basement garage, readily accessible from the alley, provides space for post-mortem examinations and a dipping vat.

In interviewing a number of men who have built small hospitals of their own, not one, seemingly, has been entirely satisfied with his building after it was completed. There always have been features that they would change if they were to rebuild. This plan is presented as a basis for the arrangement and workability of a small animal hospital and is a result of my research in this field. The plan may be altered to conform to individual needs.

P. H. HAND, K. S. C., 37.

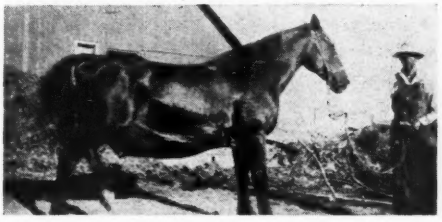
Manhattan, Kans.

* * * *

Rupture of the Prepubican Tendon in a Parturient Mare

The evening of July 4th, just as the family and myself were going to celebrate, I was called to the farm of one of my clients to see a mare. He stated she had gone to the pasture in good shape that morning, but on going to get her in the evening, he found her as shown in the illustration. As the mare was due to foal, I advised waiting till time for her delivery.

Two days later I was called hurriedly and told that the mare was foaling. I was there in a few minutes and found that she had foaled a nice, but not very lively, colt. The mare seemed strong. Her udder was



swollen and hot. She had not a drop of milk. The photo was taken at this time.

The colt was given a ration of cow's milk and lived three days. By this time the mare was not so well as when I had last seen her. She had some fever and looked abnormally full. On examination, I found that the pelvic organs were so drawn forward that she was voiding urine into the vagina and was unable to expel it. The vagina and uterus were distended with urine. Destruction was advised so her carcass could accompany the colt's to the rendering plant.

W. S. O'BRIEN.

Ryan, Iowa.

Vitamins and Distemper

III. The Symptoms of Vitamin A Deficiency

By W. O. FROHRING, Cleveland, Ohio

Many investigators have reported on the symptoms which result from deprivation of vitamin A.[1,2,3,4] Among the effects of avitaminosis are anorexia and emaciation, diarrhea, skin lesions, nervous symptoms, muscular weakness and eye abnormalities. In addition to these, cessation of growth in young animals and increased susceptibility to various infections have been noted consistently.

Anorexia and Emaciation—In this series of experiments, the first sign of vitamin A deficiency in all of the animals was anorexia. From observations on more than 100 puppies, it would seem that other signs of vitamin A deficiency may or may not appear. Other symptoms appeared sufficiently often in different litters to suggest that they are definitely related to vitamin A deficiency, but anorexia was the only consistent finding in the animals that were deprived of vitamin A, aside from the fact that death always resulted eventually when vitamin A was not supplied. Xerophthalmia is not, as many have supposed, the first or a constant symptom of vitamin A deficiency in dogs.

In order to be certain that the anorexia was due to the absence of vitamin A, the quantity of vitamin B complex was doubled in the diets of all animals that displayed a loss of appetite. In no instance did the increased ingestion of vitamin B have any effect on the anorexia, which therefore could be attributed to a lack of vitamin A. Only when curative quantities of vitamin A were added to the diets, did the appetites of these puppies return to normal.

Despite this proof of the relation of anorexia to vitamin A deficiency, a diagnosis of vitamin A deficiency can not be based upon this symptom, because it is also the first sign of several other vitamin deficiencies, as will be demonstrated later.

As a result of the anorexia, there was always extreme emaciation in the later stages of vitamin A deficiency, as is shown in fig. 11.

Changes in Body Temperature—Vitamin deficiencies often produce a profound depression of body temperatures in puppies. This will be shown also in connection with studies on the vitamin B complex. Fig. 12 illustrates not only the drop in temperature, but also the diminished food intake when anorexia, due to the deficiency, begins to appear. Puppy V-1 received a diet complete in all respects except vitamin A. Puppy V-2 (Fig. 13) also received a vitamin A-free diet. At *A* on the chart, a large dose (12,000 units daily) of cod liver oil was administered. While this quantity of vitamin A should have been ample for curative effect, in this particular instance it was insufficient to produce a response. The graph does not indicate a marked drop in weight, although the animal evidently was depleted of vitamin A. This illustrates that even though the animal may be known to be deficient in vitamin A, sometimes the administration of vitamin A in the form of cod liver oil does not produce a response and the animal dies. This, of course, occurs often in connection with experimental studdies with albino rats that are used for assay purposes. Many puppies are probably considered victims of distemper, due to similar causes. It is interesting to note from the temperature curve that no evidences of infection are obvious.

That the prognosis is better in avitaminosis when no marked drop in the body temperature takes place is shown by the chart of puppy V-8. (Fig. 14) This puppy was from the same litter as the two whose course has just been described. It received a vitamin A-free diet which was otherwise complete. At the point marked *A* the dog

displayed excessive salivation, a symptom which is usually associated with a deficiency of some factor in the B_2 complex. At *B*, 12,000 U.S.P. units of vitamin A were administered daily in the form of carotene in oil. At *C*, the excessive salivation had disappeared and the subsequent growth response, apparently produced by administration of the vitamin A is graphically shown.

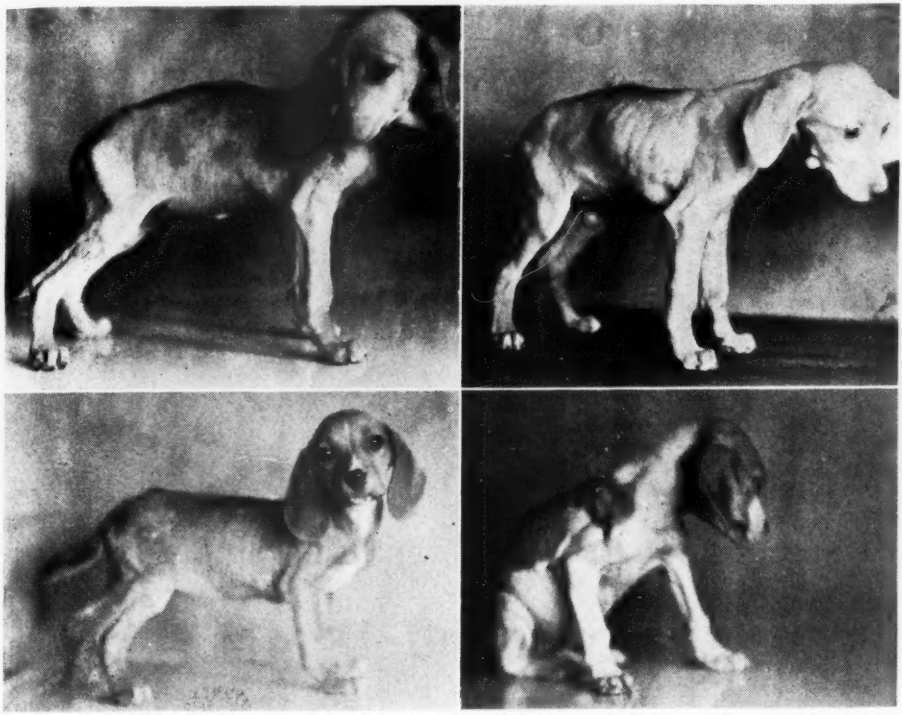


Fig. 11. Dogs showing extreme emaciation in advanced stages of vitamin A deficiency.

Diarrhea.—In experiments on more than 100 puppies, diarrhea developed with depletion of the vitamin A reserves in numerous instances, but only a few times did it progress to the stage of diarrhea with bloody mucus in the feces. Except in three puppies, care was exercised to make certain that the animals, although deprived of vitamin A, received adequate or even more than adequate quantities of the vitamin B complex. From the observations on this group of animals, it seems possible that the diarrhea which has been ascribed to lack of vitamin A often is in reality a manifestation of a deficiency of some factor of the vitamin B complex. This occurs because the animal suffers from anorexia as the result of vitamin A deficiency, which results in a reduction of the intake of food, and consequently of the vitamin B complex. This will be discussed in more detail in connection with vitamin B deficiency.

Skin Lesions.—Figure 15 illustrates the typical skin lesions observed in puppies deprived of vitamin A. Skin symptoms appeared in only about 5% of the animals that received diets deficient in vitamin A. Most of these appeared in one litter. It is interesting to note, however, that the control animals from the same litter that received vitamin A regularly showed no lesions on the skin. All the dogs with skin lesions displayed immediate and striking improvements and eventually complete cure when adequate quantities of carotene in oil

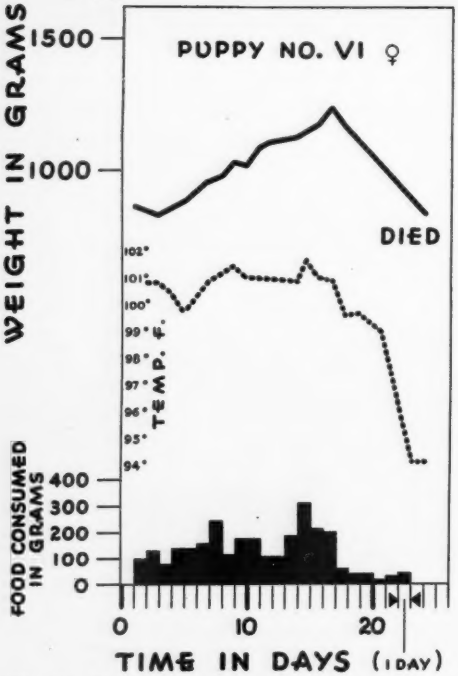


Fig. 12. Chart showing decrease in body temperature and diminished food intake in vitamin A deficiency.

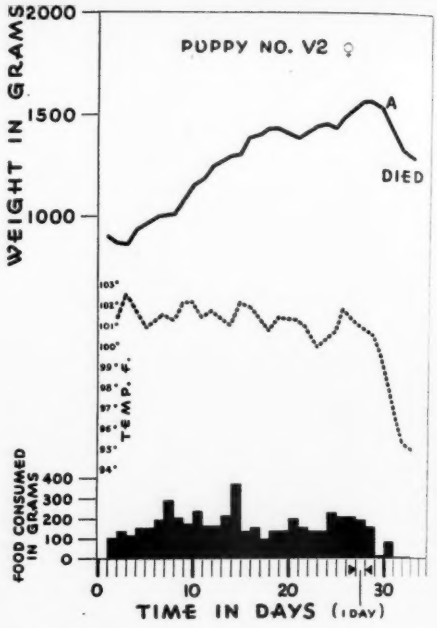


Fig. 13. Chart showing lack of response to the theoretically curative dose of vitamin A following depletion.

were administered.

Nervous Symptoms. — A common early sign of depletion of vitamin A in these experimental animals was a peculiar nervous condition. The nervousness manifested itself by the dogs running around in circles in the cages. At first it was thought that this might be due to a lack of vitamin B_1, but the condition was not corrected by increasing the quantity of the entire B complex. When some of the dogs that had manifested this symptom were examined at autopsy, neither otitis media nor brain lesions could be found. In all instances in which it was used, a liberal curative dose of vitamin A in the form of carotene in oil corrected this symptom, and the dogs returned to practically normal composure and behavior.

Muscular weakness.—In the early stages of vitamin A deficiency, many of the puppies manifested a tendency toward weakness in the hind legs. There were evidences

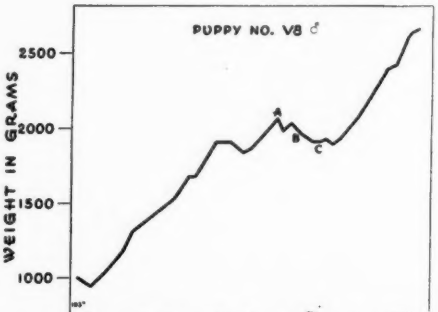


Fig. 14. Chart showing growth response of adequate curative dose of vitamin A before marked drop in body temperature.

of muscular incoordination in some instances, especially if the animal was allowed to deplete the stores of vitamin A for a long period after growth had ceased. Figure 16 demonstrates the appearance of the animals with muscular weakness. It was noted also that when the animal was depleted of vitamin A, its appearance never returned quite to normal, even though liberal curative doses of vitamin A were administered. Figure 17 shows two dogs from the same litter. "B" was never allowed to deplete his reserves of vitamin A. "A" was deprived of vitamin A, but this later was restored to the diet. Apparently the muscular weakness results from damage that can not be repaired completely by restoration of the nutritional factor.

Fig. 15. Typical skin lesions in puppies deprived of vitamin A.

Eye Abnormalities. — Steenbock [5] and others have reported in their studies on vitamin A deficiency in dogs the development of xerophthalmia which was cured by the administration of vitamin A. Stimson and Hedley [6] reported an ophthalmia which ran much the same course in all the animals which displayed it. After two or three days during which some inflammation of the eyes had been noted, the conjunctiva appeared red, full and perhaps everted. About the same time, or at most within a day or two, the cornea would have a hazy or ground-glass appearance. This condition progressed within another day or two to destructive ulceration, even to perforation in some instances. The striking feature of this ophthalmia, according to these authors, was its suddenness, and "almost explosive development." Dogs that apparently were in good health and spirits might have a deep corneal ulcer three days later. This suggests that profound but undetectable

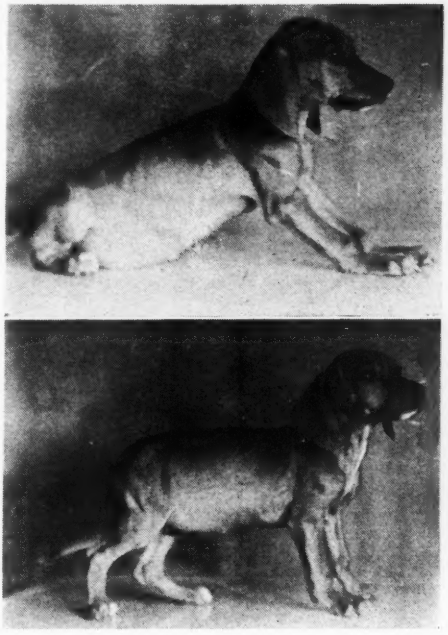


Fig. 16. Muscular weakness in puppies deprived of vitamin A.

physiologic changes must have taken place *before* the development of ocular symptoms.

In this series of experiments, eye abnormalities were not observed in all of the animals. Xerophthalmia was observed in some instances, and it seemed to develop particularly in those animals that received insufficient curative doses of vitamin A after depletion.

In long-haired breeds, such as the poodle, eye infections appeared in some instances

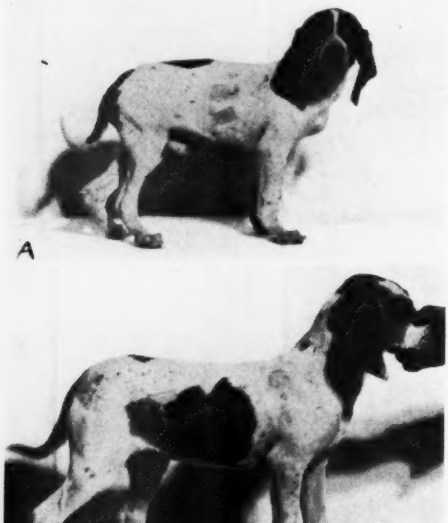


Fig. 17. Two dogs from the same litter. "A" received carotene in oil following depletion. Xerophthalmia developed following restoration of vitamin A. This disappeared when the quantity of carotene was doubled. "B" was never allowed to deplete vitamin A reserves.

when the animal, after vitamin A depletion, was given a quantity insufficient for cure. (Fig. 18) Eye infections were much less prevalent in the breeds that did not have long hair around the eyes, indicating the importance of exciting causes in the development of symptoms.

Corneal opacities were observed in some of the animals, as shown in Figure 19. They occured in one or two instances, as was reported by Stimson and Hedley in animals

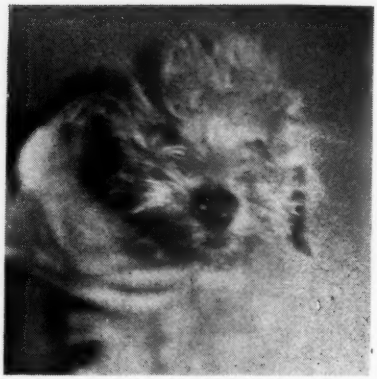


Fig. 18. Eye infection in a poodle receiving deficient quantity of vitamin A.

Fig. 19. Corneal opacity which disappeared following administration of carotene in oil.

that otherwise appeared to be normal. However, opacity of the cornea never occurred in any of the control animals that received an adequate quantity of vitamin A at all times. The corneal opacities disappeared with the administration of carotene in oil in all the instances observed. Since no other cases of this type developed subsequently, there was no opportunity, in this series, to determine whether or not the eyes would return to normal without the administration of vitamin A.

Fig. 20. Divergent strabismus in a puppy deprived of vitamin A.

A divergent strabismus was noted in many of the animals depleted of vitamin A. It sometimes appeared as one of the first signs of depletion. Curative doses of vitamin A tended to correct the condition, but in advanced cases, as shown in Figure 20, the condition was but slightly improved.

While the absence of vitamin A from the diet usually resulted in some effect on the eyes in this series of experiments, it is impossible to say from these observations in just what manner the eyes may be affected. Certain variable factors seem to be involved. The complete absence of vitamin A produces results different from those produced by an insufficient curative dose after the animal's stores of vitamin A have been depleted. Although xerophthalmia is considered the classical symptom of vitamin A deficiency, it seems that there is much to be learned regarding the relationship between vitamin A deficiency and the eyes.

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Field Inspection Chief Retires

Dr. George W. Pope, chief of the Field Inspection Division of the Bureau of Animal Industry, U. S. Department of Agriculture, retired February 26, 1937. Doctor Pope was graduated from the Chicago Veterinary College in 1889 and has been with the Bureau since 1895, having served under nine Secretaries of Agriculture.

George W. Pope

He has been chief of the Field Inspection Division since its organization in 1928. In that capacity he has directed the Federal veterinary quarantine service which excludes various foreign livestock diseases. He has also directed much of the Federal control and eradication work against cattle and sheep scabies, anthrax, dourine and glanders.

Laboratory Diagnosis of Rabies

By H. J. SHAUGHNESSEY, Springfield, Illinois,
Chief, Division of Laboratories,
State Department of Public Health

THE laboratory diagnosis of rabies has perhaps been more neglected in recent years than any other field of public health laboratory work, so far as research is concerned. That opinion was voiced at a recent meeting of the American Public Health Association in New Orleans, by Doctor Webster of Rockefeller Institute, who is now doing some fundamental work in this field about which I shall speak more later.

Although rabies is a disease of great antiquity, a laboratory diagnosis was of no consequence until we had a method of protecting persons exposed to the disease. When Pasteur had worked out his method of vaccination, it immediately became of importance to know whether or not an individual had been bitten by a rabid animal. For the most part, the laboratory diagnosis of the disease in humans is of considerably less importance, although of course it is of interest in many cases to know whether the person died of rabies or not; however, the clinical symptoms are generally so specific that they can be determined before that time.

PASTEUR, in 1885, first used a laboratory method of diagnosing rabies—the subdural inoculation of brain material from suspected animals into rabbits. Rabbits don't usually come down with rabies for about 15 to 20 days. In other words, it was two or three weeks after this inoculation before it was known whether a person had been exposed to a rabid dog. Obviously, that was not of very great practical value in determining whether or not an individual should take anti-rabies inoculations. It was of more academic importance than of practical value.

IN 1898, Wilson, in the New York City Laboratories, shortened this period to eight days by using guinea pigs instead of rabbits for his test animal. This made the test of some possible value, although still not one to be depended upon excepting for a confirmatory test. After this work came out, and even before, there were a number of investigators who thought they had observed histopathological changes which were significant of the existence of rabies, but their work was not confirmed until in 1903 when Negri described the bodies, which are named for him, in the large nerve cells and claimed that they were of definite significance in the diagnosis of the disease. Of course, development as important as this was immediately investigated in a number of laboratories throughout the world, and as a matter of fact, was independently observed in the laboratories in New York City. The nature of these bodies is still being debated, some people believe that they are the actual parasite of the disease and others believe that they are degenerate material caused by the activity of the parasite.

Negri's original work was done on paraffin sections of the brain. That is a rather tedious process and takes time. Soon other methods were developed, among them the impression method by which cut sections of the tissue are impressed against the slide, leaving some of the material there which can then be stained. Another method which is quite generally used is the smear mount or spread method. In that method, a portion of the brain tissue is placed between a slide and cover glass and smeared out to such thinness so that the stained bodies can be seen under a microscope.

But, the most important point which remained to be determined after Negri's work was the significance of the presence of these bodies and a good deal of work has

* Presented at the Seventeenth Annual Illinois Veterinary Conference, University of Illinois, Urbana, November 12-14, 1936.

been done on that subject. I think that there still remains a field to be investigated with some of our more recent technique, but nevertheless there have been some important studies. Perhaps as good an example of what has been done as any is the work described by Williams and Lowden, in York, in which they made tests on 44 brains of animals and of human beings, seven of them being from known normal animals killed for the purpose of the experiment, 27 of them were from cases exhibiting typical clinical rabies and 10 were from cases which were doubtful or suspected of being rabies. They found all of those with clinical rabies showed Negri bodies except one, in which the brain was 48 hours old and was badly decomposed. Of the brains of normal animals, only one showed the presence of Negri bodies; one of the brains from the clinically doubtful cases showed the presence of Negri bodies. To me, the most important thing in their work was that there was complete agreement between the results of the microscopic examinations for Negri bodies and of animal inoculation.

Since that time, the New York City Laboratory has been interested in this problem and their most recent statement is to this effect that they have never yet found that a brain which showed the presence of Negri bodies had failed to give rise to rabies when inoculated into suitable laboratory animals; on the contrary, they find occasionally a brain that fails to show the presence of Negri bodies that gives rise to rabies in the inoculated animals. This is the unfortunate part of the whole picture. If we find Negri bodies we know where we stand—the animal definitely had rabies; but, if we don't find them, there is always an element of doubt.

IN THE case of human beings, however, it is not necessarily true that Negri bodies are a reliable index of the presence of street virus in the brain. I have not yet seen clear cut Negri bodies in brains of humans who have died with clinical symptoms of the disease, and the brains from which gave rise to rabies in rabbits or guinea pigs when inoculation tests were made. If the Negri bodies are found in human brains at all they are usually rather small. Fortunately that is not as important as if this condition obtained regularly in brains of animals. In animals inoculated with fixed virus, which has been passed through a number of rabbits, as in the manufacture of rabies vaccine, Negri bodies may not be found and if found they are very different in appearance from those found in the brains of dogs suffering from street virus.

FROM the practical standpoint the laboratory test does not work out anywhere nearly as well as the figures quoted from Williams and Lowden would indicate. In the first place, we do not have the material that we should like to have and that is where veterinarians can help a great deal. I think most of them, probably all are aware of the fact that Negri bodies appear rather late in the course of the disease and if the anmal is destroyed soon after showing symptoms of the disease, the chances of finding Negri bodies are very much lessened. If we could put over that idea to every peace officer in the State of Illinois we would save the state a great deal of money for the purchase of unnecessary rabies vaccine and we could save a good many thousand persons the discomfort and annoyance of being vaccinated against the disease, but unfortunately in many sections, one of the first thoughts of the person who sees a rabid anmal, or who is sent out to capture the animals, is to destroy the dog as soon as possible rather than to keep it under the observation of a veterinarian that the clinical symptoms may be observed, and so that the better chance can be had for the laboratory diagnosis of the disease. Further, many specimens are received in entirely unfit condition for examination. We have tried to do everything we can to educate the public in general to submit dog's heads under certain conditions; namely, cooled at once by icing and shipped promptly, in properly iced containers to the nearest laboratory. The state maintains four laboratories for the examination of brains from animals suspected of being rabid—at Carbondale

for the southern part of the state; at Springfield and at the University for the central part, and at Chicago for the northern part of the state outside of Chicago. The city health department maintains such a laboratory for cases originating in Chicago.

A brain goes to pieces surprisingly rapidly in warm weather. I have seen brains, many of them, which according to the person who submitted the head, had been taken from the animal only a few hours before. They were so full of bacteria that it was almost impossible to see anything else besides the organisms and the nerve cells, or the identity of the latter cells was completely obliterated. Proper shipment then of specimens in double-walled, iced containers would perhaps do more toward aiding proper laboratory diagnosis of this disease than anything else which could happen at the present time. I think the use of dry ice should be investigated. Even when the heads are shipped in double-walled containers surrounded by ice, if they come a considerable distance the ice may have melted before the heads are received and consequently the brains may have deteriorated although that isn't so likely to happen.

Usually decomposed heads are received for one of the following reasons: The person kills the dog and allows it to lie around a day or so before he decides to bring it to the laboratory, or else it is shipped without any ice whatsoever in an ordinary wood or pasteboard box. We can often tell that the head is decomposed before it reaches the floor on which our laboratory is located, they are in such bad condition.

There is another limitation of the test, and that is, it is a very delicate one to perform in itself. The responsibility is so great on the person who makes the examination and if he is aware, as most of us are, of the limitations of the tests, he feels that he is up against something pretty serious. The dyes used in staining the tissues for Negri bodies are polychrome stains which are notoriously unstable and unreliable. The Negri bodies themselves are rather difficult to identify even for a person with a tremendous amount of experience. There are so many other structures which may be present in brain tissue, which may have somewhat the appearance of Negri bodies that altogether the microscopic test is not a very wonderful test. As a matter of fact, I have often wished that Negri had never discovered the test and we still had to rely on the clinical findings of dogs. I mean that from a purely selfish standpoint.

I THINK, therefore, there could be some desirable improvements in the laboratory tests for rabies. I think one thing desirable would be the submission of the whole body of the dog where that is possible. If we could make examinations of the whole animal to find out what the animal died of, we would all feel better about it. If one could say definitely this dog died of some disease other than rabies, then one would feel that one had done a great deal toward solving the problem. Of course, that would be possible only under limited conditions. Considering that we have difficulty in getting the head alone in satisfactory condition, the difficulty of getting the whole carcass in good shape can be imagined. In large cities, however, like Chicago, where a good share of the dogs are penned up by the police department and kept under observation, a complete examination of the whole carcass is feasible. Other tests in which the animal need not be shipped would be desirable. Just think how simple it would be if, instead of having to ship a whole carcass or a dog's head, the veterinarian could take a small amount of blood from a vein or by cardiac puncture and send it to a laboratory and have it determined whether or not the dog had rabies. Our laboratory workers have been dreaming of such a test for a long time. It has been described for more than 25 years, that is, testing by means of a fixation test, but unfortunately, up to the present time, none of them have been proved to be reliable. On the other hand, Webster, who has had a tremendous amount of experience in virus disease, in his paper before the Public Health Association in October 1936, showed that neutralizing antibodies in the blood serum, which would

neutralize the virus of rabies, were found very shortly after inoculation of the animal with living virus or with vaccine. If that is the case, these neutralizing antibodies should appear fairly early in the course of the disease. Webster found in some instances that these bodies appeared within six days after inoculation with virus or with vaccine. It would appear well worth while to try out this procedure and see whether it can be used as a practical diagnostic test for rabies. Tests for neutralizing antibodies are not simple, but I don't think they are any more complicated than the Wasserman test, nor even the examination of the brain for Negri bodies. If such a test were feasible, that is, if it could be done as shown by experimentation, I believe laboratories would adopt it, for it would certainly get away from a great many difficulties under which we labor in making a Negri examination.

IN CONCLUSION, I should say that our present laboratory tests for the diagnosis of rabies are perhaps reliable, considering their limitations, mainly upon the specimens themselves, rather than upon the test, and secondly, that we need more simple and conclusive tests. However, if we can overcome improper shipment of tissue under conditions in which it becomes unsuitable for laboratory examination, it may help some.

* * * *

Forty Persons Die from Rabies in Illinois

Of 40 deaths of persons in Illinois from rabies during a 10-year period (1927-36), 17 were bitten in the face, 11 bites were on the hands or arms and only four were bitten on the legs. Of these latter, three were multiple lacerations. Two cases were not bitten but were infected presumably on the hand and arm through injuries (scratches in one case and mosquito bites in the other). Both individuals had handled a rabid dog. Twenty-two of these 40 cases received the Pasteur treatment; 10 received the complete treatment (21 doses); three had 14 doses; one had 12; one, 10 and another three doses.

Selenium Poisoning

The element selenium (Se) is coming into prominence because of an alleged toxic action on man and animals. It is widely distributed in nature associated with sulphur compounds. Its action has never been widely studied until recent years when it became incriminated as the cause of alkali disease of livestock in semiarid regions. It has also attracted considerable attention in human medicine, as the gluten of wheat may contain the element in toxic amounts. The mill run of wheat contains from 0.1 to 1.9 parts per million; Canadian and South African wheat, 1 to 2 parts; Wyoming wheat, 2.7 per million, while wheat in a Dakota field showed a selenium content of 26 parts per million. A gluten purchased at random on the market was found to contain 12 parts per million, and in an experimental selenization of soil, the percentage was raised as high as 340 parts per million. These high percentages are dangerous.

The figures are taken from an editorial in the *Journal of the American Medical Association* for July 11, 1936, and are to show that selenium can and does get into plants in dangerous amount where soil contains this element in plentiful amounts.

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MISLEADING LABELS

A number of insecticide manufacturers were fined recently for violation of the Federal Insecticide Act. The failure to list on the label the inert ingredients in the package was the basis of the majority of the prosecutions.

The Huntington Laboratories of Colorado, Inc., Denver, Col., was fined $150 for shipping in interstate commerce a misbranded disinfectant called "SanPheno." The preparation contained more than 65% of water. It was represented as being positive in bactericidal action and high in germicidal strength, and was recommended for disinfecting purposes, including the disinfection of surgical instruments. It was ineffective when used as a disinfectant at the dilutions specified.

The Cooperative G. L. F. Mills, Inc., Buffalo, N. Y., was fined $150 for the misbranding and adulteration of "G L F Copper Lime Dust" and misbranding of "G L F Lime Sulphur Solution."

Jacob A. Meinhardt, trading as the Laboratory Products Co., Chicago, Ill., was fined $25, after a plea of guilty, for shipping in interstate commerce a misbranded disinfectant called "Klen-Zit." The product contained more than 94 percent of water and other inert ingredients.

Strongylosis in a Colt

A routine microscopic examination of equine feces for strongyle eggs reveals the fact that practically all horses are infected. Odinarily the strongyles seem not to be detrimental to the animal; however, they may be a more serious problem, than is fully realized, in colts and horses weakened by some unfavorable condition, such as a ration of cornstalks and straw and a barbed wire fence for shelter. The Veterniary Ambulatory Clinic of the Kansas State College received a call November 17, 1936, to investigate the cause of unthriftiness in a colt.

The colt, a two-year-old filly, was found down in the pasture; emaciated and weak. The mucous membranes were pale; the feces thin and watery, and the temperature was 100.5°F. This animal had been losing weight for about a month.

A diagnosis of strongylosis was made and the following treatment was given:

Oil of chenopodium.....5cc
Oil of turpentine.....½ ounce
Castor oil .....12 ounces
Mineral oil .....1 pint

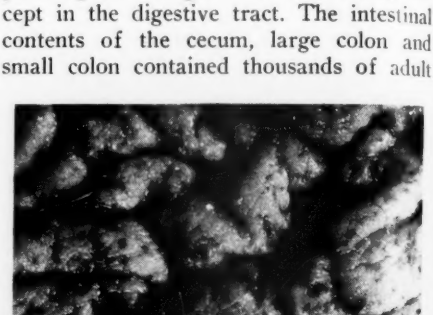
This was administered with a stomach tube and pump.

After this treatment, the colt showed some improvement for a few days, but soon began to weaken again. She was then brought into the veterinary hospital and supported in slings.

A fecal examination revealed strongyle eggs. A blood count was made and showed a leucocytosis. The red cell count had dropped from a normal of 7,000,000 to 4,500,000 per cmm. Chemical analysis showed a normal calcium level. The phosphorus was 4.8mg per 100cc.

The colt was given 500cc of a 12½% solution of sodium cacodylate, 500cc of 20% calcium gluconate and 500cc of a 1:1000 solution of phosphoric acid intravenously. A second blood analysis showed a normal calcium level. The phosphorus had increased in amount to 6.2mg per 100cc, which is about normal. The red count remained unchanged and leucocytes were still present in large numbers. Despite treatment, the colt got weaker and had to be destroyed November 27th.

On postmortem examination no marked pathological changes could be found, except in the digestive tract. The intestinal contents of the cecum, large colon and small colon contained thousands of adult



strongyles. The intestinal mucosa of these areas was pitted with the small round lesion of the larvae. These larvae were uniformly spread over the whole surface of the mucous membrane; averaging 30 to 40 larvae to the square inch.

The accompanying illustration of a section of the large colon shows the myriads of larvae on the mucosa and a few adult strongyles. No doubt many cases of unthriftiness in horses and colts, and their failure to respond to treatment, can be traced to the presence of large numbers of these parasites. No treatment seems to be effective in attacking the buried larvae.

G. W. Bayles, K. S. C., 37.
Manhattan, Kans.

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Horses in the German Army

The effective strength of horses and mules in the German Army for the year 1933 and 35,745, distributed as follows: Cavalry, 16,444; artillery and train, 8,606; infantry, 7,630; miscellaneous, 3,065. There were, in addition, in military employ, 626 dogs and 4,125 pigeons.—*Jour. R. A. V. C.*

Annual Conference for Veterinarians at Cornell University

The twenty-ninth annual Conference for veterinarians was held at the New York State Veterinary College, Ithaca, New York, January 7th and 8th, 1937.

Dr. H. L. Gilman presided at the morning session of the first day. Motion pictures "Wound Healing I" was the first feature on the program. This part of the film is a vivid portrayal of the operation of natural forces in wound healing by second intention. Dr. D. H. Udall made the "Opening Remarks." Doctor Udall traced the development of the conference and veterinary science. He showed that since the first annual conference, perplexing veterinary problems had been solved and become simple, and that those which now and in the future perplex will likewise admit of solution.

Dr. H. H. Dukes gave a talk, illustrated with moving pictures, on "Gastro-intestinal Motility in the Ruminant." The pictures were made by the speaker in his own laboratory. They are a helpful contribution to the knowledge of the types of movement, their functions and the rôles they play in helping to carry out the work of stomach and intestines in the ruminant.

Professor L. W. Sharp, professor of cytology in the College of Agriculture at Cornell, lectured next on the "Physical Basis of Heredity." The speaker showed how the genes that transmit hereditary characteristics were isolated and identified by experiments on fruit flies. By artificial treatment with x-ray, the genes were influenced in several days to an extent that would require years naturally. Studies in human and animal heredity are held to be gainers from these studies.

Drs. H. J. Milks and H. C. Stephenson spoke on "Diabetes in Dogs." Symptoms, diagnosis, treatment and prognosis of the cases presented were supported by reports of blood, urine, and in some cases, post-mortem findings. Such records are increasing evidence to veterinarians and owners that the dog is subject to diabetes and should be protected from it.

Dr. H. H. Dukes presided during the afternoon session of the first day. A film "Ovulation, Fertilization, and Early Development of the Mammalian Egg" was an instructive opening number. Dr. E. A. Caslick, Paris, Kentucky, detailed his "Observations on Breeding Problems of the Thoroughbred Mare." Doctor Caslick discussed the incidents and practices in connection with the breeding of 989 mares, 683 foaling and 306 having been barren. The time of the review was for the period 1932-36. Care of the breeding animals, the time of breeding, mortality of foals under 30 days, and the abortion mortality of foals under thirty days, and the abortion mortality with causes were subjects discussed. Several excellent charts were an aid to speaker and audience. Dr. Frank Bloom, a practitionr of Flushing, N. Y., spoke on the "Clinical Interpretations of Urine Analysis." Experience gained from the analysis of samples from hundreds of his patients was the basis for a helpful discussion of those characteristics and constituents most helpful in establishing diagnosis and treatment. A chart, showing the principal complaint, the disease and the changes in the urine, lent added value to a helpful discussion.

Erwin A. Tusak, M.D., New York, N. Y., has shown a deep interest in "Eye Diseases in Veterinary Medical Practice." His enthusiasm was transmitted to us through his well illustrated discussion of the physiology and pathology of the eye. Relating angiology, urology, metabolic changes, and the state of the nervous system to the study of the eye disorders was held to be helpful.

Dr. R. R. Birch discussed "Natural and Artificial Immunity to *Brucella abortus*." The speaker said that the use of vaccine for the control of Bang's disease has been rather generally discredited. Calfhood vaccination with a strain of low virulence (U.S.B.A.I. No. 19) shows somewhat more encouraging results than other strains so far used. Vaccination was recommended only in heavily infected herds. Further tests are required to reveal the efficiency of the low-virulence strain.

The early part of the evening of the first day was reserved for alumni meetings. At the close of these meetings the members of the Conference were guests at an indoor polo game at the Cornell Riding Hall. The game was made possible through the courtesy of the Department of Military Science and Tactics and Major C. E. Boyle, polo coach. Three teams, the "Ringbones," "Capped Hocks," and "Fistulous Withers" put on the games. The "Ringbones" and "Capped Hocks" played three spirited chukkers. The score, 16-15, favored the "Ringbones." This team is, at most games, the Varsity team. Roberts, Combs, and T. Lawrence are veterinary students who are helping to make polo history at Cornell. Christian and H. Lawrence of the other teams, are veterinary students to be. The "Capped Hocks" beat the "Fistulous Withers" in a two-period game. The entertainment was real and appreciated.

Clinics and demonstrations were held from nine o'clock to eleven of the second morning. A well diversified program was carried out. Visiting specialists and members of the staff provided the operations and demonstrations.

At 11:00 A.M., Dr. Fred W. Miller gave a lecture and demonstration on "Artificial Insemination." Doctor Miller reviewed the physiological requirements. He told an interested audience that transportation, extended service, and prevention of disease, justified the process. Injection of semen into the cervix has proved more successful in his practice than vaginal insemination. Methods for obtaining semen from the male and its injection into the cervix of the female were demonstrated.

The program of the second afternoon was guided by Dr. M. G. Fincher. The film "Wound Healing II" an instructive continuity of film I was the first offering. "Recent Developments in Minerals and Vitamins for Farm Animals" was the topic developed by L. A. Maynard, Professor of Animal

Nutrition, Cornell University. Recognition of the species difference in requirements was stressed especially in relation to the vitamins. This applies more to poultry than other animals. Calcium, phosphorus, iodine, iron, and copper were mentioned as minerals most useful in animal nutrition. Zinc manganese, magnesium, cobalt, sulphur, and potassium are others playing a part. That lack of magnesium or cobalt may contribute to distinct disease syndromes, was indicated. Iron is supplied in inorganic just as successfully as in organic compounds. The rôle of iodine was noted and suggestion made that it is not economical to feed it to cows in order to increase it in the milk. Doctor Maynard indicated that natural foods are a better source of vitamins and minerals for animals than special mixtures. They are held to be abundant in food properly blended. "Significance of the Hemolytic Streptococci Found in Milk" was discussed by J. Howard Brown, Professor of Bacteriology, Johns Hopkins Medical School. Professor Brown said that milk-borne diseases are due to human streptococci which have entered the udder rather than to mastitis organisms. By way of comparison and identification it was pointed out that sorbital and hippurate negative reacting mastitis strains are bovine strains and that those organisms that liquefy human fibrin are human pathogens.

Drs. D. W. Baker, H. C. Stephenson, and A. G. Danks introduced a "Colloquim on the Diagnosis and Control of Animal Parasitism." Many helpful ideas were advanced during the introduction and the extended discussions which followed.

Dean Hagan presided at the conference dinner, held at Willard Straight Hall. Cornelius Betten, Dean of the University Faculty brought "Greetings from the University"—a gracious greeting from a kindly, scholarly gentleman who has long held a true interest in agriculture and veterinary medicine.

Dr. Cassius Way represented President Foster and the A.V.M.A. Dr. Way pointed out the disparity between eastern and western membership in the A.V.M.A. He pleaded for an increase in eastern interest and membership.

H. E. Babcock, a trustee of Cornell University, and his "Kernels, Screenings, and Chaff" are known to millions of people. The development of farm organizations, the struggles through years of poor prices and depression, to a firmer economic situation at the present were parts of farm history reviewed. The increasing value of farm accounts owed veterinarians and the influence of government control over farmers as affecting both farmers and veterinarians were reviewed by the speaker.

A. A. Allen, Professor of Ornithology, Cornell University, took the guests "Hunting with a Microphone." Birds, their habitat, their calls and songs and their habits were the fruits of the hunting expedition held in the south and west. Several sound films made this expedition most interesting and helpful to all of us.

With an attendance of slightly less than 300, the conference has passed into history. Its helpfulness to practitioners and staff has marked another milestone. The helpfulness and influence continue to grow with the successive years.

C. E. HAYDEN,

Ithaca, N. Y.

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Mrs. Dodge Honored

Because of her untiring efforts in behalf of American dogdom, During 1936, Mrs. M. Hartley Dodge of Giralda Farms, Madison, N. J., was named as the recipient of the third annual Chappel Award, presented at the opening of the Westminster Dog Show in Madison Square Garden, New York City, Feb. 10, 1937.

The award, a suitably inscribed plaque, is given each year by the Chappel Kennel Foundation,

Rockford, Ill., for distinguished service to American dogdom.

Presentation of the award was made by John G. Bates, president of the Westminster Kennel club, at the judges' luncheon held in connection with the annual show in New York.

In making their choice the judges considered nominations of individuals sent in by the general public, editors, club members and writers in dogdom in response to an invitation issued during the year by the Chappel Foundation.

In her efforts toward the improvement of American breeds, Mrs. Dodge has imported from England and continental countries the best blood obtainable and her support in this respect has been given alike to sporting dogs, working dogs, the pet and household breeds.